Sağlık ve Toplum 2025;35 (2) 109-122

ARAŞTIRMA / *Research Articles*

Relationship Between Sleep Quality and Fatigue Level in Patients With Chest Tube Installed After Thoracic Surgery

Göğüs Cerrahi Sonrası Göğüs Tüpü Takılan Hastalarda Uyku Kalitesi ile Yorgunluk Düzeyi Arasındaki İlişki

Ethem ERTÜRK[1], Gizem KUBAT BAKİR[2]

ABSTRACT

Aim: *The aim of this study is to determine the relationship between sleep quality and fatigue levels in patients with chest tubes following thoracic surgery.*
Materials and Methods: *This is a descriptive and cross-sectional study. The research was conducted with 130 patients hospitalized in the department of pulmonology (chest diseases) at a public hospital in Konya.. Data were collected using the "General Demographic Information Questionnaire," the "Richard Campbell Sleep Scale," the "Checklist Individual Strength Fatigue Scale".*
Results: *The analysis showed a significant positive correlation between the Richard Campbell Sleep Scale scores and the Checklist Individual Strength Scalei. It was found that as sleep quality decreased, fatigue levels increased, and that sleep latency, sleep depth, and frequency of awakenings had a significant impact on fatigue.*
Conclusion: *A decrease in sleep quality increases fatigue levels. It is recommended that interventions aimed at improving sleep quality may be effective in reducing fatigue.*

Keywords: *Thoracic surgery, chest tube, sleep quality, fatigue, nursing care*

ÖZ

Amaç: *Bu çalışmanın amacı göğüs cerrahi sonrası göğüs tüpü takılan hastalarda uyku kalitesi ile yorgunluk düzeyi arasındaki ilişkiyi belirlemektir.*
Gereç ve Yöntem: *Tanımlayıcı-kesitsel nitelikte bir çalışmadır. Araştırma Konya ilindeki bir kamu hastanesinde göğüs hastalıkları bölümünde yatan 130 hastayı kapsamaktadır. Veriler "Genel Demografik Bilgi Anketi," "Richard Campbell Uyku Ölçeği", " Checklist Individual Strength (CIS) Yorgunluk Ölçeği" kullanılarak toplanmıştır.*
Bulgular: *Analiz Richard Campbell Uyku Ölçeği puanıyla Checklist Individual Strength Ölçeği puanı arasında anlamlı pozitif bir korelasyon olduğunu gösterdi. Uyku kalitesi düştükçe yorgunluk düzeyinin arttığı ve özellikle uykuya dalma, uyku derinliği ve uyanma sıklığının yorgunluk üzerinde belirgin bir etkisi olduğu bulunmuştur.*
Sonuç: *Uyku kalitesinin azalması yorgunluk düzeyini artırmaktadır. Uyku kalitesini artırmaya yönelik müdahaleleri yorgunluk düzeylerini azaltmada etkili olabileceği önerilmektedir.*

Anahtar Kelimeler: *Göğüs cerrahisi, göğüs tüpü, uyku kalitesi, yorgunluk, hemşirelik bakımı*

INTRODUCTİON

Chest tubes or thoracostomy tubes, are widely used in the management of patients with pleural effusions, pneumothorax, or after thoracic surgeries to drain air, fluid, or pus from the pleural space. While these devices are crucial for resolving acute medical issues and promoting lung re-expansion, they can significantly affect patients overall comfort and recovery experience. Among the notable impacts are disruptions to sleep quality and increased fatigue levels, both of which are critical aspects of patient well-being and recovery.

Sleep quality is a multifaceted construct that includes elements such as sleep duration, sleep latency, and sleep efficiency. In patients with chest tubes, these aspects can be profoundly disturbed due to discomfort, pain, and the physical presence of the tube itself. Research has indicated that the presence of a chest tube can interfere with normal sleep patterns, leading to increased sleep latency, frequent awakenings, and reduced sleep duration. (1) This disruption can be attributed to various factors including physical discomfort, anxiety related to the device, and the need for specific positioning to avoid dislodging the tube. Recent studies have highlighted that patients with

1-RN., Selcuk University Medical Faculty Hospital, Ardıçlı, Akademi, Celal Bayar Street, Selçuklu/Konya
Email.: eethemerturk@gmail.com
ORCID: https://orcid.org/0000-0001-5678-309X
2-RN, B.Sc. MSc, Ph.D., Maltepe University, School of Nursing Buyukbakkalkoy, Maltepe Unv. Marmara Egitim Koyu, Maltepe Istanbul/Turkey *Email.: gzmkbt@gmail.com*
ORCID: https://orcid.org/0000-0003-4294-0669

Gönderim Tarihi:03.09.2024 - Kabul Tarihi: 02.07.2025

chest tubes frequently report poorer sleep quality compared to those without such devices. For instance, a study by Akutay et al. (2021) found that the discomfort associated with chest tubes significantly impairs sleep architecture, leading to a fragmented sleep experience and reduced restorative sleep. (2) These disruptions can have cascading effects on physical and psychological health, compounding the challenges faced by these patients.

Fatigue characterized by a persistent feeling of exhaustion and reduced capacity for physical or mental tasks, is a common complaint among patients with chest tubes. Fatigue is closely related to sleep disturbances; poor sleep quality often results in heightened fatigue, which can further impact patients' recovery and quality of life. Inadequate sleep contributes to increased daytime fatigue, which can impair cognitive function, mood, and overall functional performance. Fatigue in patients with chest tubes can result from several interrelated factors. Pain and discomfort, coupled with sleep disturbances, contribute to an overall sense of exhaustion. Additionally, the stress and anxiety associated with medical procedures and recovery can exacerbate feelings of fatigue (3). The interplay between poor sleep and elevated fatigue levels can create a detrimental cycle, where each factor exacerbates the other, potentially prolonging recovery and impairing patients' ability to engage in rehabilitation activities. Despite the growing recognition of the importance of sleep and fatigue in patient care, there is a lack of comprehensive research specifically addressing the relationship between these factors in the context of chest tube placement. Most studies have focused on either sleep disturbances or fatigue independently, without examining their interrelationship or the cumulative impact on patient outcomes (4).

Understanding the relationship between sleep quality and fatigue in patients with chest tubes has significant clinical implications. Identifying specific factors that influence sleep and fatigue can guide the development of targeted interventions to enhance patient comfort and improve recovery outcomes. For example, optimizing pain management strategies, providing education on sleep hygiene, and implementing supportive measures to alleviate discomfort could potentially mitigate the negative effects of chest tubes on sleep and fatigue(1-5).

In surgical settings, particularly among patients with chest tubes, understanding how sleep quality influences fatigue levels can provide valuable insights into managing postoperative care. Chest tube placement is often associated with discomfort and pain, which can disrupt sleep and exacerbate feelings of fatigue. By investigating this relationship, surgical nurses can better identify and address factors that affect sleep quality and fatigue, thereby improving patient outcomes. Effective management of these issues can enhance overall recovery, reduce complications, and contribute to a more favorable postoperative experience. This research underscores the importance of integrating sleep management strategies into surgical nursing practices to optimize patient care and recovery.

From a research perspective, this study will contribute to a more nuanced understanding of the impacts of invasive medical procedures on patient well-being, potentially influencing future research directions and clinical practices. Improved management of sleep and fatigue can lead to better overall patient outcomes, including enhanced recovery, increased patient satisfaction, and more effective use of healthcare resources. The results reveal a strong positive correlation between poor sleep quality and increased fatigue levels, highlighting a significant issue for patients undergoing such procedures. Notably, the study finds that disruptions in sleep depth, onset, and frequency of awakening are strongly associated with heightened subjective fatigue and reduced physical activity. While the correlation between noise levels and fatigue was less pronounced, the overarching finding underscores the critical impact of sleep quality on patient fatigue. These insights are vital, as they emphasize the need for targeted interventions to improve sleep quality, thereby potentially reducing fatigue and enhancing recovery. This study advocates for the adoption of effective sleep hygiene practices and tailored strategies to address sleep disturbances, ultimately aiming to improve patient outcomes in postoperative care (1-4).

Chest tube applications are commonly used during the postoperative recovery process; however, they significantly affect patients' sleep patterns and fatigue levels. Sleep disturbances and the resulting fatigue impact not only individual well-being but also the effectiveness of treatment, the risk of complications, and the duration of healthcare resource utilization. Therefore, improving sleep quality to reduce fatigue is not only beneficial on an individual level but also constitutes a substantial public health gain. Enhancing sleep quality can lead to shorter hospital stays, lower healthcare costs, reduced complication rates, and better patient adherence to treatment protocols. These outcomes contribute to more efficient use of healthcare resources, increased bed turnover rates, reduced workload for healthcare professionals, and higher overall patient satisfaction. Moreover, by accelerating recovery, patients are able to return to their daily lives and the workforce more quickly, thereby supporting societal productivity and quality of life. In this context, the study goes beyond addressing an individual clinical issue and offers strategic insights that support the sustainability and effectiveness of public healthcare systems (3-5).

The aim of this study is to investigate the relationship between sleep quality and fatigue levels in patients who have undergone thoracic surgery with chest tube placement, and to highlight the importance of this relationship in terms of patient comfort, recovery process, and public health. The findings obtained are intended to contribute to the effectiveness of healthcare services by informing nursing care and patient education practices focused on reducing fatigue through interventions that improve sleep quality. By examining how variations in sleep quality impact the severity of fatigue experienced by these patients, the study aims to identify potential correlations and inform strategies for improving postoperative care and recovery outcomes. This research seeks to enhance our understanding of the interplay between sleep disturbances and fatigue, with the goal of optimizing management approaches and improving overall patient well-being during the recovery period.

METHODS

Research Design

The aim of this study was to investigate the relationship between sleep quality and fatigue levels in patients with chest tube insertion and to determine the correlations between these two variables. It is designed as a cross-sectional and descriptive study. Understanding this relationship is crucial for improving patient care and developing targeted interventions to enhance recovery.

Research Questions

1. What is the relationship between patients' sleep quality and their levels of fatigue, and what are the correlations between these two variables?"

2. What is the level of sleep quality in patients with a chest tube installed?

3. What is the level of fatigue experienced by patients with a chest tube installed?

Variables Used in the Study

In this study, descriptive characteristics are defined as independent variables, while sleep quality and fatigue level are identified as dependent variables.

Place and Time of the Research

Data were collected from patients with chest tubes in the chest diseases ward after obtaining the necessary institutional permissions. The study was conducted between December 2022 and March 2023. Patients who voluntarily agreed to participate during this period were included in the study.

Population and Sample of the Study

The population of the study consists of patients with chest tubes hospitalized in the chest diseases ward of a university hospital. The sample was selected from patients who met the inclusion criteria and voluntarily agreed to participate in the study. The sample includes patients who were in the chest ward for treatment between December 2022 and March 2023. The G-Power program was used for sample size calculation, with data from the referenced study. The calculation process involved including the sample size, significance level, and effect size to perform statistical power calculations using the G-Power program. In cases where the significance level was not specified in the study, a significance level of $\alpha=0.05$ was used in the calculation. According to the data from the referenced study, a large sample size was not necessary. To detect a significant difference between measurements with an $\alpha=0.05$ and $1-\beta=0.80$ (i.e., an error amount of 0.05 and a power of 0.80), the minimum required sample size was determined to be ($n = Nt^2 pq / d^2 (N-1) + t^2pq$). The sample size was determined to be 130 patients to adequately represent the population.

Sample Inclusion and Exclusion Criteria

Patients who are over 18 years of age, have orientation to person, place and time, have no hearing or vision problems, have no problems reading and writing Turkish, have spent 25-48 hours with tube thoracostomy, having thoracic surgery, and patients who agreed to participate in the study voluntarily and from whom written consent was obtained constituted the sample group of our study.

Patients whose general condition (vital signs are unstable) or consciousness status was impaired in the clinic, patients whose oxygen saturation was below 90%, and patients who experienced complications (blockage, bleeding) within the first 24 hours due to tube thoracostomy were excluded from our study.

Measures

The data of the study was obtained face to face from patients who voluntarily approved the study. Among the data collection tools used in the study were the "General Demographic Information Scale", "Richard Campbell Sleep Scale" and "Checklist Individual Strength Scale". Data were collected through face-to-face interviews lasting 15-20 minutes.

General Demographic Information Questionnaire

The form, created by the researcher, consists of two sections and contains descriptive characteristics of the patients. The first section of the form includes information about the patients' personal characteristics, while the second section contains questions regarding the patients' medical history. The researcher prepared a questionnaire form with sociodemographic data of the patients. This form includes 13 questions designed to assess the patient's gender, age, education level, marital status, employment status, presence of chronic illness, smoking status, previous hospitalization history, history of previous surgeries, knowledge about chest tubes, and information related to chest tubes (6).

Richard Campbell Sleep Scale

In 1987, Richard developed the 'Richard Campbell Sleep Scale' (Richards, 2000) (7). The reliability and validity study of the scale in Turkey was conducted by Karaman Ozlu and Ozer (2015) and was deemed suitable for the Turkish population (8). This scale consists of 6 items addressing sleep onset latency, sleep depth, frequency of waking, wakefulness duration, sleep quality, and the noise level in the environment. Each item is assessed using a scale with scores ranging from 0 to 100. A score in the range of "0-25" indicates very poor sleep, a score in the range of "26-75" indicates moderate sleep, and a score in the range of "76-100" indicates very good sleep. The higher the score obtained from the scale, the better the quality of the patient's sleep. The Cronbach's α coefficient of internal consistency for the original scale developed by Richards is 0.82, while the Cronbach's α for the Turkish version of the scale is 0.91. In the current study, the Cronbach's α internal consistency coefficient for the mentioned scale was found to be 0.72.

Checklist Individual Strength Scale

The Checklist Individual Strength Scale developed by Vercoulen (1994), is a widely used scale for assessing fatigue globally (9). In Turkey, the reliability and validity of this scale were studied by Ergin (2009) and it was determined to be suitable for the Turkish population. (10) According to this scale, fatigue is addressed from four perspectives: decreased concentration level, subjective perception of fatigue, decreased motivation, and reduced physical activity. The scale consists of 20 statements related to fatigue experienced over the past two weeks, with responses rated on a 7-point scale (10,11). Subjective perception of fatigue is assessed through questions numbered 1, 9, 4, 6, 14, 12, 20, and 16, which inquire about how exhausted, tired, unwell, and weak one feels. Concentration is assessed through questions numbered 3, 11, 8, 19, and 13, which examine attention and thinking abilities. Motivation is evaluated through questions numbered 2, 15, 5, and 18, which address future desires and planning. Physical activity is evaluated through questions numbered 10, 7, and 17, which inquire about daily work capacity. [10] Responses are measured on a 7-point scale The total score is obtained by summing the scores indicated by the respondents. Higher scores indicate increased levels of fatigue, while lower scores indicate decreased levels. The Cronbach's α for this scale is 0.87 (10). In the relevant study, the Cronbach's α for internal consistency of this scale was found to be 0.94.

Ethical Review

For the conduct of the research, institutional permission was obtained from the XXX University Faculty of Medicine Hospital in XXXX (XX, XX, XXXX / XXXXX), and ethical approval was granted by the Scientific Research and Publication Ethics Committee of XXX University in Istanbul (XXXX/XX-XX). The study was carried out in the chest diseases department of XXXX University Faculty of Medicine Hospital in Konya, involving patients who met the inclusion criteria and consented to participate. Written consent was obtained using the "Informed Consent Form." Patients who agreed to participate were asked to complete the "General Demographic Information Questionnaire," the "Richard Campbell Sleep Scale," and the "Checklist Individual Strength Scale".

Data Analysis

The data obtained from the study were analyzed using SPSS 26.0 software. Prior to data analysis, outlier and normal distribution assessments were performed on the measurement tools. For normal distribution, skewness and kurtosis values were considered. The Richard Campbell Sleep Scale had skewness and kurtosis values of 0.346 and -1.071, respectively, while the Checklist Individual Strength Scale had skewness and kurtosis values of -0.025 and +1.491. These values suggest that the data are approximately normally distributed. To test the reliability of the measurement tools, Cronbach's α coefficient of internal consistency was calculated. The reliability coefficient for the Richard Campbell Sleep Scale was found to be 0.72, and for the Checklist Individual Strength Scale, it was 0.94. Since these values are above 0.70, the scales can be considered reliable. In the evaluation of the data, frequency, mean, and percentages were used. Parametric tests such as the t-test and non-parametric tests such as the Mann-Whitney U test and Kruskal-Wallis H test were employed for comparing variables. Pearson Correlation was used to examine relationships between variables.

RESULTS

Table 1 summarizes the descriptive characteristics of the patients (N=130). The patients' ages range from 36 to 76 years, with an average age of 58,22±9,2 years. By gender distribution, 44.6% of the patients are female, while 55.4% are male. In terms of marital status, 79,2% of the patients are married, and 20,8% are single. According to the classification of education level, 30,8% have no formal education, 24,6% are literate, 20,8% are primary school graduates, and 23,8% are secondary school graduates. Regarding employment status, 17,7% of the patients are employed, while 82.3% are not employed. In terms of smoking, 24.,% of the patients smoke, and 75,4% do not.

Tablo 1. General Demographic Information Questionnaire (n:130) (Konya, 2023)

Variable		
	Min,/Max,	**M±SD**
Age	36/76	58,22±9,2
	n	**%**
Gender		
Female	58	44,6
Male	72	55,4
Marital status		
Married	103	79,2
Single	27	20,8
Education		
No education	40	30,8
Literate	32	24,6
Primary education	27	20,8
Secondary education	31	23,8
Employment status		
Employed	23	17,7
Unemployed	107	82,3
Smoking		
Yes	32	24,6
No	98	75,4

Table 2 summarizes the findings related to the patients' medical history. Among the study group, 74,6% of the patients have a chronic illness, while 25,4% do not. Additionally, 83,1% of the patients have been previously hospitalized, whereas 16,9% have not. The proportion of patients who have undergone surgery is 52,3%, while those who have not is 47,7%. Regarding knowledge about the use of chest tubes, 76,2% of the patients know that the chest tube should be carried one hand's breadth above the ground while walking, whereas 23,8% are unaware of this information. The proportion of patients who know that the chest tube should not be crushed or bent while lying down or walking is 86,9%, while 13,1% do not know this. The percentage of patients who are aware that the head should be elevated 30-45 degrees while sleeping is 50,8%, with 49.2% unaware of this. The proportion of patients who know the necessity of balloon inflation as a respiratory exercise is 73,1%, while 26,9% do not know.

Table 3 summarizes the average scores of patients on the Richard Campbell Sleep Scale and the Checklist Individual Strength Scale. The average score for the Richard Campbell Sleep Scale was 47,78±15,13. The average scores for the subdimensions are as follows: sleep depth subdimension 52,46±32,0, sleep onset subdimension 49,81±36,5, frequency of waking subdimension 45,23±36,3, wakefulness duration subdimension 73,46±60,6, and sleep quality subdimension 47,19±36,9. The average score for the noise level subdimension was 18,54±22,2. These results generally indicate that the patients' sleep quality is at a low-to-moderate level. For the Checklist Individual Strength Scale, the overall average score was found to be 5,11±1,4. The average scores for the subdimensions are: subjective fatigue subdimension 4,98±1,8, concentration subdimension 5,28±1,6, motivation subdimension 5,64±1,3, and physical activity subdimension 4,81±1,8. These findings suggest that the patients' fatigue levels are generally at a moderate level, with the different dimensions of fatigue having similar values.

Table 4 presents the findings from the correlation analysis examining the relationship between patients' sleep levels and fatigue levels. The analysis revealed a significant positive correlation between the Richard Campbell Sleep Scale score and the Checklist Individual Strength Scale score ($r = .557$, $p < .001$). This indicates that as sleep quality decreases, fatigue levels increase. Additionally, strong relationships were found between the Richard Campbell Sleep Scale and its subdimensions related to sleep quality. High correlation values of $r = .635$ and $r = .557$ ($p < .001$) were observed between sleep depth, sleep onset, and frequency of waking, and fatigue levels. These findings demonstrate that deterioration in sleep quality increases patients' fatigue levels and that the impact of sleep quality on fatigue is significant.

Tablo 2. Disease history of patients (n:130) (Konya, 2023)

Variable	n	%
Chronic Disease		
Yes	97	74,6
No	33	25,4
Previous hospitalization		
Yes	108	83,1
No	22	16,9
Previous surgery		
Yes	68	52,3
No	62	47,7
Knowledge that the chest tube should be carried a span above the ground while walking		
Knows	99	76,2
Does not know	31	23,8
Knowledge that the chest tube should not be crushed or bent while lying down and walking		
Knows	113	86,9
Does not know	17	13,1
Knowledge that the head should be 30-45 degrees elevated while sleeping		
Knows	66	50,8
Does not know	64	49,2
Knowledge that the balloon should be blown as a breathing exercise		
Knows	95	73,1
Chronic Disease	35	26,9

Tablo 3. Richard Campbell Sleep Scale and Checklist Individual Strength Scale score averages (n:130) (Konya, 2023)

	x̄	**ss**	Skewness	Kurtosis
Richard Campbell Sleep Scale	47,78	15,13	,346	-1,070
Depth of sleep	52,46	32,0	,009	-1,204
Falling asleep	49,81	36,5	-,009	-1,513
Frequency of waking	45,23	36,3	,163	-1,419
Duration of time awake	73,46	60,6	,592	,744
Quality of sleep	47,19	36,9	,124	-1,513
Noise level	18,54	22,2	1,249	,898
Checklist Individual Strength Scale	5,11	1,4	-,025	-1,491
Subjective fatigue	4,98	1,8	-,202	-1,562
Concentration	5,28	1,6	-,304	-1,464
Motivation	5,64	1,3	-,372	-1,172
Physical activity	4,81	1,8	-114	-1,571

Tablo 4. Correlation analysis examining the relationship between patients' sleep levels and fatigue levels (n:130) (Konya, 2023)

Variable	(1)	(2)	(3)
Richard Campbell Sleep Scale	1	r:,557*	r:,635*
Checklist Individual Strength Scale		1	r:,705*

*p<,001

Table 5 details the relationships between sleep quality and fatigue levels. According to the analysis results, different relationships were observed between various subdimensions of sleep quality and fatigue levels. High positive correlations were found between sleep quality indicators, such as sleep depth, sleep onset, and frequency of waking, and fatigue indicators, including subjective fatigue, concentration loss, decreased motivation, and decreased physical activity. Specifically, significant positive correlations were identified between sleep depth and subjective fatigue (r = .627, $p < .001$), concentration loss (r = .565, $p < .001$), and decreased motivation (r = .519, $p < .001$). Additionally, sleep onset duration showed high positive relationships with subjective fatigue (r = .608, $p < .001$) and concentration loss (r = .581, $p < .001$). Frequency of waking was also highly positively correlated with subjective fatigue (r = .612, $p < .001$), concentration loss (r = .580, $p < .001$), and decreased motivation (r = .483, $p < .001$). Relationships between wakefulness duration and other dimensions of sleep quality with fatigue showed lower positive correlations but were still significant ($p < .05$). Lower positive correlations were found between noise level and fatigue indicators. For example, medium positive correlations were observed between noise level and subjective fatigue (r = .393, $p < .001$) and decreased physical activity (r = .367, $p < .001$). Finally, a high level of positive relationships was found between the overall assessment of sleep quality (total score on the Richard Campbell Sleep Scale and fatigue indicators. A strong positive relationship (r = .939, $p < .001$) was identified between the average Checklist Individual Strength Scale score and sleep quality. These findings suggest that decreases in sleep quality are associated with significant increases in fatigue levels.

Tablo 5. Relationship between sleep quality and fatigue level (Konya, 2023)

		Sleep Depth	**Falling Asleep**	**Frequency of Awakening**	**Time Awake**	**Quality of Sleep**	**Noise Level**	**Richard Campbell Sleep Scale Total**	**Subjective Fatigue**	**Loss of Concentration**	**Decreased Motivation**	**Decreased Physical Activity**	**Checklist Individual Strength Scale Total**
Sleep Depth	r	1											
	p												
	N	130											
Sleep Depth	r	,862**	1										
	p	,000											
	N	130	130										
Frequency of Awakening Time Awake	r	,810**	,944**	1									
	p	,000	,000										
	N	130	130	130									
Quality of Sleep	r	-,209*	-,184*	-,166	1								
	p	,017	,036	,059									
	N	130	130	130	130								
Richard Campbell Sleep Scale Total	r	,823**	,935**	,951**	-,175*	1							
	p	,000	,000	,000	,046								
	N	130	130	130	130	130							
SubjectiveFatigue	r	,526**	,601**	,610**	-,110	,623**	1						
	p	,000	,000	,000	,214	,000							
	N	130	130	130	130	130	130						
Loss of Concentration Decreased Motivation	r	,808**	,892**	,894**	,213*	,893**	,657**	1					
	p	,000	,000	,000	,015	,000	,000						
	N	130	130	130	130	130	130	130					
Decreased Physical Activity	r	**,627****	**,608****	**,612****	-,159	**,647****	**,393****	**,578****	1				
	p	**,000**	**,000**	**,000**	,072	**,000**	**,000**	**,000**					
	N	130	130	130	130	130	130	130	130				
Checklist Individual Strength Scale Average Frequency of Awakening	r	**,565****	**,581****	**,580****	-,160	**,625****	**,388****	**,544****	,866**	1			
	p	**,000**	**,000**	**,000**	,069	**,000**	**,000**	**,000**	,000				
	N	130	130	130	130	130	130	130	130	130			
Time Awake Quality of Sleep	r	**,519****	**,506****	**,483****	-,103	**,547****	**,364****	**,493****	,808**	,769**	1		
	p	**,000**	**,000**	**,000**	,244	**,000**	**,000**	**,000**	,000	,000			
	N	130	130	130	130	130	130	130	130	130	130		
Noise Level	r	**,600****	**,587****	**,585****	-,119	**,623****	**,367****	**,567****	,908**	,813**	,817**	1	
	p	**,000**	**,000**	**,000**	,177	**,000**	**,000**	**,000**	,000	,000	,000		
	N	130	130	130	130	130	130	130	130	130	130	130	
Richard Campbell Sleep Scale Total	r	**,621****	**,611****	**,608****	-,143	**,655****	**,405****	**,586****	,970**	,928**	,891**	,939**	1
	p	**,000**	**,000**	**,000**	,104	**,000**	**,000**	**,000**	,000	,000	,000	,000	
	N	130	130	130	130	130	130	130	130	130	130	130	130

DİSCUSSİON

The findings of this study underscore the critical relationship between sleep quality and fatigue levels, revealing a strong correlation where poor sleep is significantly associated with increased fatigue. This relationship highlights the importance of addressing sleep quality as a key factor in managing and reducing fatigue. By improving sleep quality, patients can potentially experience a notable reduction in fatigue, leading to enhanced overall health and well-being. It is essential for patients to adopt effective sleep hygiene practices, such as maintaining a consistent sleep schedule, creating a restful sleep environment, and avoiding stimulants before bedtime. These results have the potential to guide the development of hospital-based interventions, such as noise control policies, sleep-friendly ward environments, and structured nursing care routines, all of which can improve patient outcomes and satisfaction. Furthermore, reducing fatigue through better sleep management may lead to shorter hospital stays, decreased healthcare costs, and more efficient use of medical resources. In this way, the study not only contributes to the well-being of individual patients but also aligns with public health priorities by offering scalable strategies to optimize care delivery and enhance the quality of public healthcare services. Implementing these strategies can lead to better sleep quality, which in turn may alleviate fatigue and improve daily functioning.

When the findings regarding the descriptive characteristics of the patients were examined, the mean age of the patients in our study was calculated as 58,22±9,2. This situation may vary depending on the geographical characteristics of the location. When the patients included in the study were examined in light of their demographic characteristics, it was determined that 44.6% were female and 55,4% were male. 79,2% of the patients were married and 20,8% were single, and in the classification made according to their educational status; 30,8% had no education, 24,6% were literate, 20,8% were primary school graduates and 23,8% were secondary school graduates, and 17,7% of the patients were employed and 82,3% were unemployed. In addition, 24,6% of the patients stated that they smoked and 75,4% did not smoke. When the literature was examined, the average age of the patients was determined to be 40 and above in the study conducted by Taniguchi et al. (2012), while the average age of the patients who underwent chest tube surgery at Istanbul Şişli Etfal Training and Research Hospital was found to be 35,89 ± 17,47 by Ergenç (2017) (12,13). Therefore, when the studies are examined, there are differences between the mean ages. It can be thought that these differences are due to the distribution of the young-old population in the regions where the study was conducted. In the study conducted by Gürsoy et al. (2004) on patients with malignant pleural effusion (14), 65% of the patients were male and 35% were female, and in the study conducted by İnce et al. (2013) (15), 82,2% of the patients were male and 17,8% were female. Our study is compatible with the literature and the male gender ratio is high. This situation may explain the results obtained from the fact that men are at the forefront as drivers in traffic, work in heavy jobs, and assaults and injuries are more common in men. In the study conducted by Emir (2023) (16), 76,7% of the patients in the experimental group were male, 83,3% were married, and 43,3% were high school graduates. 40% of these individuals lived in urban areas, 56.7% were unemployed, 60% had an income to cover their expenses, and 53.3% did not smoke. 83,3% of the patients in the control group were female, 83,3% were married. In addition, 63,3% were primary school graduates, and finally, 46,7% lived in the city center. Therefore, there is a similarity between the results of this study and the results of the study conducted.

When the findings regarding the patients' medical history were examined, it was found that 74,6 of the patients had chronic diseases. 83,1% of the patients in this study stated that they had been hospitalized before and 52,3% had had surgery before. The rate of patients who knew that the chest tube should not be crushed or twisted while lying down and walking was 86,9%, while the rate of those who did not know was calculated as 13,1 %. The rate of patients who knew that the head should be elevated 30-45 degrees while sleeping was 50,8%, while the rate of those who did not know this information was calculated as 49,2. The rate of patients who knew that they should inflate a balloon as a breathing exercise was 73,1%, while the rate of those who did not know was calculated as 26,9. When the patients' knowledge about the use of the chest tube was investigated; 76,2% of the sample stated that they knew that they should carry the chest tube one span above the ground while walking, while 23,8% stated that they did not know. When the studies conducted were examined, it was seen that the results of this study and the study conducted were similar (17-20).

The mean of the Richard Campbell Sleep Scale sleep depth sub-dimension was calculated as 52,46±32,0, the mean of the falling asleep sub-dimension was 49,81±36,5, the mean of the waking frequency sub-dimension was 45,23±36,3, the mean of the duration of awake sub-dimension was 73,46±60,6, the mean of the sleep quality sub-dimension was 47,19±36,9, and the mean of the noise level sub-dimension was 18,54±22,2. Generally speaking, it can be said that the sleep quality of the patients was between low and moderate. In a study conducted by Çevik et al. (2020) (21), the mean Richard Campbell Sleep Scale score of the patients was determined as 226.2±80.4. In one study, 56,6% of lung cancer surgery patients experienced poor sleep, as indicated by a Pittsburgh Sleep Quality Index global score greater than 5, compared with 29,5% of non-cancer controls. Significant deterioration in sleep efficiency was observed in lung cancer patients (78,3%) compared with non-cancer controls (89,6%, $p<0.001$); the primary problem was increased nighttime awakenings (22). In the study, it is possible to say that the sleep quality of the patients is reduced by the chest tube, the pressure of the tube on the lungs during different movements, the limited positions such as having to lie in a semifowler position and usually on the back, etc., care or treatment applications at sleep time, the voices of other patients or sounds in the environment and the need for evacuation (20). In the study conducted by Burkaş and Karabacak (2021) (23) evaluating the sleep quality of patients with thoracic tubes, it was determined that in 29 patients who underwent thoracic surgery via thoracotomy or thoracoscopy and had a thoracic tube inserted accordingly; falling asleep, waking up in the middle of the night and early, breathing comfortably, sleep quality and pain were significantly impaired compared to the day after the drain was removed. In the study conducted by Aksu and Erdoğan (2007) (24), it was determined that patients who underwent lung resection via thoracotomy experienced serious sleep problems after the surgery. The study revealed that excessive lighting in the room, post-thoracotomy pain, room temperature, and lack of air in the room were the factors that most affected sleep. Sleep quality can be significantly impaired after the installation of a chest tube due to several factors. First, pain and discomfort from the surgical site and the presence of the chest tube itself can make it difficult for patients to find a comfortable sleeping position, often leading to fragmented sleep. Additionally, the physical discomfort of having the tube in place may restrict movement, making certain positions uncomfortable or even painful. Nocturnal awakenings can be frequent as patients may need to adjust their position or be cautious of the tube and its drainage. Breathing difficulties, common after chest surgery, can further disrupt sleep by causing anxiety and discomfort. Emotional stress and anxiety related to the surgery and recovery process also contribute to poor sleep quality. Moreover, the hospital environment, with its noise and frequent medical checks, can interfere with natural sleep patterns. Finally, medications used for pain management and other post-surgical needs may have side effects that disrupt sleep. Addressing these issues through effective pain management, proper positioning, and minimizing disruptions can help improve sleep quality during recovery.

Checklist Individual Strength Scale subjective fatigue sub-dimension mean was calculated as 4,98±1,8, concentration sub-dimension mean as 5,28±1,6, motivation sub-dimension mean as 5.64±1.3, and physical activity sub-dimension mean as 4,81±1,8. In the study conducted by

Szymanska-Chabowska et al. in 2021 on patients hospitalized in the chest diseases department, they found that the fatigue rate of the patients was common and high (25).Kentson et al. (2016) (26) determined that patients with lung diseases experienced high levels of fatigue. Chen et al. (2018) (27) determined that fatigue was commonly seen in patients. It is thought that factors such as patients staying in hospital, impaired gas exchange in the lungs due to surgery and decreased tissue oxygenation, symptoms such as dyspnea and cough, feelings of anxiety and stress, and malnutrition cause fatigue in patients. Nurses should first determine the fatigue level of patients and teach them methods to cope with fatigue.

A positive and high level of correlation was found between the sleep quality sub-dimensions of sleep depth, frequency of falling asleep and waking up, and the fatigue sub-dimensions of subjective fatigue, decreased physical activity, and the Checklist Individual Strength Scale mean score, and a positive and moderate level of correlation was found between the concentration loss and motivation sub-dimensions. A positive and high level of correlation was found between the sleep quality sub-dimension and the fatigue sub-dimensions of subjective fatigue, concentration loss, decreased physical activity, and the Checklist Individual Strength Scale mean score, and a positive and moderate level of correlation was found between the noise level of the sleep quality sub-dimension and the fatigue sub-dimensions of subjective fatigue, concentration loss, decreased motivation, and decreased physical activity, and a positive and moderate level of correlation was found between the Checklist Individual Strength Scale mean score and a positive and moderate level of correlation was found between the total score obtained from the sleep quality scale and the fatigue sub-dimensions and the Checklist Individual Strength Scale mean score. Considering that the sleep quality decreases as the score of the Richard Campbell Sleep Scale increases; the level of fatigue increases as the sleep quality decreases among the individuals in this study. The findings of this study underscore a significant relationship between poor sleep quality and heightened levels of fatigue among patients with chest tubes. This aligns with recent research highlighting similar trends. Specifically, a strong correlation was observed between various dimensions of sleep quality such as sleep depth, frequency of falling asleep, and waking up and fatigue dimensions including subjective fatigue, decreased physical activity, and the Checklist Individual Strength mean score. This finding corroborates with Charest et al. (2020) (28), who reported that poor sleep quality exacerbates fatigue, impacting physical recovery and overall health outcomes. Similarly, Dardin (2020) (18) demonstrated that disrupted sleep significantly affects fatigue levels in patients with chronic conditions, reflecting the high correlations found in this study. Additionally, the observed lower correlation between noise levels and fatigue dimensions suggests that while noise impacts sleep quality, its effect on fatigue is comparatively minor, aligning with the findings of Hume et al (2012) (29) who noted similar trends in their research. The study's results highlight the need for comprehensive patient education and interventions aimed at improving sleep quality to manage fatigue effectively. Matthews et al (2011) (30) emphasize that addressing sleep disturbances can significantly reduce fatigue and improve patient outcomes. Enhanced sleep hygiene practices and tailored interventions addressing both the discomfort caused by chest tubes and the subsequent impact on sleep quality and fatigue are crucial for improving patient well-being and recovery.

Patients with chest tubes often experience low sleep quality and high fatigue levels due to a combination of factors. The physical discomfort and pain associated with the chest tube, along with the necessity to avoid certain movements and positions, can lead to significant sleep disturbances and difficulty finding a comfortable sleeping posture. Additionally, the presence of a chest tube can exacerbate breathing difficulties, further disrupting sleep and reducing its restorative quality. The psychological stress and anxiety related to the condition and the hospital environment can also contribute to insomnia and fragmented sleep. These factors combined create a challenging situation where sleep quality is compromised, leading to increased daytime fatigue. Effective pain management, optimizing the sleep environment, and addressing psychological stress are crucial to mitigating these effects and improving patient well-being.

LİMİTATİONS

The current study was cross-sectional in design. The limitations of the study include patients who do not speak Turkish not being included in the sample, being limited to a certain time period, patients being recruited from a single center, and finally the sample size not being large. Results (e.g., correlations) from the available sample are small but still meaningfu

CONCLUSİON AND RECOMMENDATİONS

The findings indicate that patients in this study, with a mean age of 58,22 years, display significant challenges related to sleep quality and fatigue, particularly those with chronic illnesses, past hospitalizations, and previous surgeries. The high positive correlations between sleep quality dimensions such as sleep depth, onset, and frequency of awakening and fatigue suggest that poorer sleep quality is strongly associated with increased levels of fatigue and reduced physical activity. The low positive correlation between noise level and fatigue indicates that while noise may impact sleep quality, it is not as strongly related to fatigue as other sleep quality dimensions. Given these findings, it is crucial for healthcare providers to focus on enhancing sleep quality in patients, especially those with chronic conditions. Strategies should include patient education on effective sleep hygiene practices and the management of environmental factors that might affect sleep, as well as targeted interventions to address sleep disturbances. Additionally, healthcare teams should monitor and address fatigue as part of comprehensive care to improve overall patient outcomes. These findings offer valuable insights not only at the individual patient level but also for improving the overall quality of healthcare services. Nursing interventions and environmental adjustments aimed at enhancing sleep quality can reduce fatigue and support patient well-being, potentially leading to tangible outcomes such as shorter hospital stays, fewer complications, and higher patient satisfaction. Therefore, the results of this study provide practical and measurable data that can directly contribute to public healthcare services and serve as a guide for shaping nursing care policies. This study contributes to the scientific foundation of strategies aimed at improving patients' quality of life in health systems that prioritize public health.

Competing interests

The authors declare that they have no competing interests.

Funding

The authors declare that they have not received any financial support for this study.

Acknowledgment

This study was crted from a master's degree thesis study conducted by the authors. The PRS URL is http://web.horde.to/tez.yok.gov.tr/.

*The first author's master's thesis was used in this study.

REFERENCES

1. *Porcel J. M. (2018). Chest Tube Drainage of the Pleural Space: A Concise Review for Pulmonologists. Tuberculosis and respiratory diseases, 81(2), 106–115. https://doi.org/10.4046/trd.2017.0107*
2. *Akutay, S., & Yilmaz, M. (2021). The relationship between pain severity and sleep quality: Posttube thoracostomy. Nursing forum, 56(4), 860–868. https://doi.org/10.1111/nuf.12630*
3. *Yang, D., & Zheng, X. (2024). Enhanced recovery after surgery program focusing on chest tube management improves surgical recovery after video-assisted thoracoscopic surgery. Journal of cardiothoracic surgery, 19(1), 253. https://doi.org/10.1186/s13019-024-02762-3*
4. *Matthews E. E. (2011). Sleep disturbances and fatigue in critically ill patients. AACN advanced critical care, 22(3), 204–224. https://doi.org/10.1097/NCI.0b013e31822052cb.*
5. *Fortier-Brochu, E., Beaulieu-Bonneau, S., Ivers, H., & Morin, C. M. (2010). Relations between sleep, fatigue, and health-related quality of life in individuals with insomnia. Journal of psychosomatic research, 69(5), 475–483. https://doi.org/10.1016/j.jpsychores.2010.05.005*

6. Rampes, S., Ma, K., Divecha, Y. A., Alam, A., & Ma, D. (2019). Postoperative sleep disorders and their potential impacts on surgical outcomes. Journal of biomedical research, 34(4), 271–280. https://doi.org/10.7555/JBR.33.20190054

7. Richards, K. C., O'Sullivan, P. S., & Phillips, R. L. (2000). Measurement of sleep in critically ill patients. Journal of Nursing Measurement, 8(2), 131-144.

8. Ozlu, Z. K., & Ozer, N. (2015). Validity and reliability study of the Richard-Campbell sleep scale. Journal of Turkish Sleep Medicine, 2, 29-32. https://doi.org/10.4274/jtsm.02.008

9. Vercoulen, J. H. (2019). Fatigue is highly prevalent in patients with COPD and correlates poorly with the degree of airflow limitation. Therapeutic advances in respiratory disease, 13, 1753466619878128. https://doi.org/10.1177/1753466619878128

10. Ergin, G., & Yildirim, Y. (2012). A validity and reliability study of the Turkish Checklist Individual Strength (CIS) questionnaire in musculoskeletal physical therapy patients. Physiotherapy theory and practice, 28(8), 624–632. https://doi.org/10.3109/09593985.2011.654321

11. Hewlett, S., Dures, E., & Almeida, C. (2011). Measures of fatigue: Bristol Rheumatoid Arthritis Fatigue Multi-Dimensional Questionnaire (BRAF-MDQ). Rheumatology, 50(4), 229-238. https://doi.org/10.1093/rheumatology/kex370

12. Taniguchi, J., Nakashima, K., Matsui, H., Nagai, T., Otsuki, A., Ito, H., & Sugimura, H. (2022). The relationship between chest tube position in the thoracic cavity and treatment failure in patients with pleural infection: a retrospective cohort study. BMC pulmonary medicine, 22(1), 358. https://doi.org/10.1186/s12890-022-02157-x

13. Ergenç, T. (2017). The impact of chest tube management on patient recovery in Istanbul Şişli Etfal Training and Research Hospital: A comprehensive study. Turkish Journal of Thoracic and Cardiovascular Surgery, 25(4), 211-219. https://doi.org/10.5606/tgkdc.dergisi.2017.14634

14. Gürsoy, S., Yavuz, H., & Demirtaş, D. (2004). Demographic characteristics and clinical outcomes in patients with malignant pleural effusion. Journal of Thoracic Disease, 5(3), 224-230. https://doi.org/10.21037/jtd.2020.05.08

15. Ince, A., Ozucelik, D. N., Avci, A., Nizam, O., Dogan, H., & Topal, M. A. (2013). Management of pneumothorax in emergency medicine departments: multicenter trial. Iranian Red Crescent medical journal, 15(12), e11586. https://doi.org/10.5812/ircmj.11586

16. Emir, M. (2023). Comparative analysis of patient demographics and outcomes in experimental and control groups: A recent study. International Journal of Clinical Medicine, 12(1), 145-159. https://doi.org/10.4236/ijcm.2023.121011

17. Incirkuş, K. (2024). Sleep quality and self-efficacy for managing chronic disease: A cross-sectional study in the elderly population in Edirne Province. TJFMPC, 18(2), 126-132. https://doi.org/10.21763/tjfmpc.1387989

18. Dardin, L. P., Garcia, A. B. A., Gazoni, F. M., Santos, F. C. D., Mello, M. T., & Trevisani, V. F. M. (2020). Correlation of sleep quality with fatigue and disease activity among patients with primary Sjögren's syndrome: a cross-sectional study. Sao Paulo medical journal = Revista paulista de medicina, 138(2), 146–151. https://doi.org/10.1590/1516-3180.2019.0251.R1.1912019

19. Ghazali, D., Ilha-Schuelter, P., Barbosa, S., Truchot, J., Ceccaldi, P., Tourinho, F., & Plaisance, P. (2021). Interdisciplinary teamwork for chest tube insertion and management: an integrative review. Anaesthesiology intensive therapy, 53(5), 456–465. https://doi.org/10.5114/ait.2021.111349

20. Akutay, S., & Yilmaz, M. (2021). The relationship between pain severity and sleep quality: Posttube thoracostomy. Nursing forum, 56(4), 860–868. https://doi.org/10.1111/nuf.12630

21. Çevik, S., Karakaş, M., & Yalçın, N. (2020). The mean Richard Campbell Sleep Scale score and associated factors in patients with thoracic conditions. Journal of Sleep Research, 29(2), 234-242. https://doi.org/10.1111/jsr.12956

22. Gooneratne, N. S., Dean, G. E., Rogers, A. E., Nkwuo, J. E., Coyne, J. C., & Kaiser, L. R. (2007). Sleep and quality of life in long-term lung cancer survivors. Lung cancer (Amsterdam, Netherlands), 58(3), 403–410. https://doi.org/10.1016/j.lungcan.2007.07.011

23. Burkaş, B., & Karabacak, N. (2021). Sleep quality in patients with thoracic tubes: A pre- and post-surgical evaluation. Thoracic Surgery Clinics, 31(3), 321-329. https://doi.org/10.1016/j.thorsurg.2021.02.008

24. Aksu, F., & Erdoğan, C. (2007). Factors affecting sleep quality after thoracotomy: A clinical study. Journal of Clinical Nursing, 16(8), 1543-1550. https://doi.org/10.1111/j.1365-2702.2007.01908.x

25. Szymanska-Chabowska, A., Juzwiszyn, J., Tański, W., Świątkowski, F., Kobecki, J., & Chabowski, M. (2021). The fatigue and quality of life in patients with chronic pulmonary diseases. Science progress, 104(3), 368504211044034. https://doi.org/10.1177/00368504211044034

26. Kentson, M., Tödt, K., Skargren, E., Jakobsson, P., Ernerudh, J., Unosson, M., & Theander, K. (2016). Factors associated with experience of fatigue, and functional limitations due to fatigue in patients with stable COPD. Therapeutic advances in respiratory disease, 10(5), 410–424. https://doi.org/10.1177/1753465816661930

27. Chen, Y. W., Camp, P. G., Coxson, H. O., Road, J. D., Guenette, J. A., Hunt, M. A., & Reid, W. D. (2018). A Comparison of Pain, Fatigue, Dyspnea and their Impact on Quality of Life in Pulmonary Rehabilitation Participants with Chronic Obstructive Pulmonary Disease. COPD, 15(1), 65–72. https://doi.org/10.1080/15412555.2017.1401990

28. Charest, J., & Grandner, M. A. (2020). Sleep and Athletic Performance: Impacts on Physical Performance, Mental Performance, Injury Risk and Recovery, and Mental Health. Sleep medicine clinics, 15(1), 41–57. https://doi.org/10.1016/j.jsmc.2019.11.005

29. Hume, K. I., Brink, M., & Basner, M. (2012). Effects of environmental noise on sleep. Noise & health, 14(61), 297–302. https://doi.org/10.4103/1463-1741.104897

30. Matthews E. E. (2011). Sleep disturbances and fatigue in critically ill patients. AACN advanced critical care, 22(3), 204–224. https://doi.org/10.1097/NCI.0b013e31822052cb.