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The Relationship Between Environmental Stressors and Sleep Quality in Patients in Intensive Care Unit

Yoğun Bakım Ünitesinde Yatan Hastaların Uyku Kalitesi ile Algıladıkları Çevresel Stresörler Arasındaki İlişki

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Abstract

This study evaluated the relationship between environmental stressors perceived by patients in the intensive care unit and their sleep quality. The study was a descriptive, cross-sectional, and correlational study. Data were collected from 176 patients in the intensive care unit between April and December 2021. The mean age of the patients included in the study was 64.7±12.50 years, and the duration of treatment in the intensive care unit was 2.68±0.85 days. The mean score of the Richard-Campbell Sleep Questionnaire was 37.01±17.84, and Intensive Care Unit Environmental Stressors Scale was 131.63±19.18. There was a statically significant negative correlation between The Richard-Campbell Sleep Questionnaire score with the duration of therapy in the intensive care unit (p<0.001), pain (p<0.001), and fatigue (p<0.001). A negative statistically significant correlation was seen between the Intensive Care Unit Environmental Stressors Scale and the Richard-Campbell Sleep Questionnaire (p<0.001). As a result of this study, the sleep quality of patients in the intensive care unit was found to be affected by environmental stressors. In addition, fatigue and pain were found to have an effect on sleep quality, and environmental factors also affected patients' waking status in the intensive care unit.

Keywords: Environment, intensive care, nursing, sleep, stress

Özet

Bu araştırma yoğun bakım ünitesinde yatan hastaların uyku kalitesi ile algıladıkları çevresel stresörler arasındaki ilişkinin değerlendirilmesi amacıyla yapıldı. Araştırma tanımlayıcı, kesitsel ve ilişki arayıcı türdedir. Araştırmanın verileri yoğun bakım ünitesinde yatan 176 hastadan Nisan-Aralık 2021 tarihleri arasında toplandı. Çalışmaya dahil edilen hastaların yaş ortalaması 64,76±12,50 yıl ve yoğun bakım ünitesinde yatış süresi 2,68 ± 0,85 gün idi. Richard-Campbell Uyku Kalitesi Ölçeği puan ortalaması 37,01±17,84, Yoğun Bakım Ünitesi Çevresel Stresörler Ölçeği puan ortalaması 131,63±19,18 idi. Richard-Campbell Uyku Kalitesi Ölçeği skoru ile yoğun bakım ünitesinde tedavi süresi (p<0,001), ağrı (p<0,001) ve yorgunluk (p<0,001) arasında negatif yönde istatistiksel olarak anlamlı korelasyon bulundu. Yoğun Bakım Ünitesinde Çevresel Stresörler Ölçeği ile Richard-Campbell Uyku Kalitesi Ölçeği arasında negatif yönde istatistiksel olarak anlamlı korelasyon bulundu (p<0,001). Bu çalışmanın sonucunda, yoğun bakım ünitesinde tedavi alan hastaların uyku kalitesinin çevresel stresörlerden etkilendiği bulundu. Ayrıca, uyku kalitesine yorgunluk ve ağrının etkisi olduğu çevresel faktörlerin hastaların yoğun bakımda uyanma durumlarını da etkilediği belirlendi.

Anahtar Kelimeler: Çevre, hemşirelik, stres, uyku, yoğun bakım

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1. Introduction

Intensive care units (ICU) are specialized units where patients are closely monitored and treated for life-threatening, acute, and chronic disease conditions. Life support devices with advanced technological features are used, vital signs are monitored 24 hours a day, multidisciplinary health professionals are available, and emergency interventions and specific treatments are performed (Zengin et al., 2020).

With the developing technology in the ICU, the opportunities for follow-up, diagnosis, and specific treatment of life-threatening diseases are increasing. On the other hand, the effects of adverse environmental stressors are increasing. In this context, ICU is an environment where patients are exposed to physical and psychosocial stressors (Aktaş et al., 2015; Reuter-Rice et al., 2020).

Sleep is a basic need for human survival and essential for critically ill adults' recovery (Hu et al., 2015). Sleep abnormalities frequently happen in the ICU. These problems include irregular sleep cycles, sleep disruption, and deprivation (Pisani et al., 2015). Sleep is a complicated process influenced by biological and environmental factors crucial for resting, repairing, well-being, and survival. Sleep is a complicated process influenced by biological and environmental factors crucial for resting, repairing, well-being, and survival. To fully understand the cause of sleep disturbance in critically ill patients, it is first necessary to understand the nature and characteristics of sleep (Kamdar et al., 2012).

Biological and environmental factors both have an impact on the complex process of sleep, and there is increasing evidence that this has a negative impact on sleep disorders. (Pisani et al., 2015). Sleeplessness is recognized as an important stressor in ICUs (Aktaş et al., 2015). The most important patient-derived factors for sleeplessness among the ICU patients include the severity and the type of the underlying disease, patient-related factors, pain, delirium, the pathophysiology of the acute illness, stress, and death anxiety. Furthermore, environmental factors in the ICU include inappropriate exposure to noise and light, mechanical ventilation, the temperature of the environment, all equipment used for treatment, and being subjected to regular medical administration (Bihari et al., 2012; Elliott et al., 2013; Gencer & Kumsar, 2020; Kamdar et al., 2012).

In patients in the ICU, quality sleep is considered one of the important factors to ensure recovery. Poor sleep negatively affects many body systems, the immune system, and hormone levels (Pisani et al., 2015; Reuter-Rice et al., 2020). Adults in the ICU frequently experience sleep deprivation or irregular sleep patterns (Hu et al., 2015). Sleeplessness leads to fatigue, weakness, irritability, daytime sleepiness, agitation, and hallucinations, and also decreases learning, impairs performance, and extends the time of reaction (Xie et al., 2013). It is of great importance for intensive care nurses to be aware of the factors that negatively affect sleep quality and to know the possible consequences of regulating the sleep of critically ill patients and the necessary therapeutic nursing practices.

2. Method

The study was a descriptive, cross-sectional, and correlational study.

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2.1. Aim

The study aimed to evaluate the relationship between environmental stressors perceived by patients in the ICU and their sleep quality.

2.2. Setting

The data were collected in the ICU of a training and research hospital in Istanbul between April and December 2021. In the ICU where the data were collected, there were two separate general adult intensive care units. There was a total of 20 patient care beds. The beds were separated from each other by glass walls and curtains. Approximately six nurses, two doctors, and sufficient healthcare assistants, and cleaners worked every shift in each ICU.

2.3. Sample

The study population consisted of all adult patients receiving treatment in the ICU of an Istanbul training and research hospital. Power analysis was used to calculate the sample of the study. Accordingly, at 85% power α = 0.05, the sample size was 152 patients. Also, considering the cross-sectional study method, the data was collected from 176 patients between April and December 2021. The following inclusion criteria were applied: being over 18 years of age, being treated in the ICU for 24-72 hours (patients who received treatment for more than 72 hours were excluded from the sample to exclude the possibility of delirium), not being on mechanical (invasive/noninvasive) ventilation, being conscious, having a normal Glasgow Coma Scale score and orientation to place and time (13 points and above), not using sleep aids, and being willing to communicate and participate in the study.

2.4. Data Collection

The patient sociodemographic form, sleep assessment form, The Richard-Campbell Sleep Questionnaire (RCSQ), and Intensive Care Unit Environmental Stressors Scale (ICUESS) were used for data collection. The researchers collected the data through face-to-face interviews with the patients after their treatment and care were completed in the morning.

2.4.1. The Patient Sociodemographic Form

There were 11 questions, including socio-demographic characteristics, duration of treatment in the ICU, duration of sleep at night, and reasons for sleep interruption at night. The Glasgow Coma Scale, which was a part of the inclusion criteria of the patients in the study, was used as a standard in the ICU and was obtained from the patient's files.

2.4.2. The Richard-Campbell Sleep Questionnaire

The scale developed by Richards consists of 6 items (Richards et al., 2000). Özlü and Özer conducted Turkish reliability validation in 2015 (Özlü & Özer, 2015). Patients are asked to rate each item on the scale between 0 and 100 points. Item 6, which evaluates the noise level in the environment, is not included in the total score evaluation. The total score obtained from the scale is divided by the number of questions, and the result is found. A score of "0-25" indicates "very poor sleep," and a score of "76-100" indicates "very good sleep." A minimum score on the scale of 0 points and a maximum score on

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the scale of 100 points can be gained from the scale. An increase in the score obtained from the scale indicates an increase in sleep quality. Cronbach's alpha internal consistency of the scale is 0.91.

2.4.3. Intensive Care Unit Environmental Stressors Scale

This scale determines the environmental stressors perceived by patients in the ICU. The scale was developed by Ballard in 1981 and revised by Cochran and Ganong in 1989 (Ballard, 1981; Cochran & Ganong, 1989). Çinar, Aslan, and Kurtoğlu conducted Turkish reliability validation in 2010 (Çinar et al., 2011). In the scale consisting of 42 items in total, the rating is a 4-point Likert-type scale, including the items "not at all" (1), "very little" (2), "frequently" (3), and "very much" (4). The lowest score is 42, and the highest score is 168. A high score indicates that the stress experienced by the patients is intense. The internal consistency coefficient Cronbach's alpha value of the scale is 0.94.

2.5. Ethical Considerations

Ethics committee permission was obtained to conduct the study (Date and number: 08.02.2021-8459). Written and verbal informed, voluntary consents were obtained by explaining to the individuals who participated in the study the purpose of the research, that all personal information would remain confidential, that they could leave the research at their request, and that the research data would not be shared with anyone. The principles of the Declaration of Helsinki were followed.

2.6. Limitations

The first limitation of the study is that it was conducted in the Istanbul province and in a single ICU. Another limitation was that participants were selected from a population using a nonprobability method. Therefore, the study's results might be generalized for only this group.

2.7. Statistical Analyses

Data were evaluated using the SPSS 25.0 (Statistical Program for Social Sciences) package program. Frequency, arithmetic mean, standard deviation, and percentage descriptive statistics were used for data distribution. Skewness and Kurtosis test was used to evaluate the conformity of the data to normal distribution. One-way ANOVA and Independent Samples t-test were chosen to compare the mean total scores of the questionnaire and variables. Pearson correlation analysis test was used for correlation analysis.

3. Results

In the study, the mean age of participants was 64.76 ± 12.50 years. Of the patients, 50.0% (n=88) were female, 81.8% (n = 144) were married, and 48.9% (n = 86) were high school graduates. It was found that 20.5% of the patients (n = 36) had at least one chronic disease diagnosed by a physician other than the diagnosis of ICU admission (Table 1).

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Table 1. Demographic characteristics of patients

Characteristics		Mean ± SD	Min-Max.
Age (year) *		64.76 ± 12.50	31.00-91.00
		n	**%**
Gender	Female	88	50.0
	Male	88	50.0
Education	Literate	6	3.4
	Primary school	63	35.8
	High school	86	48.9
	University	21	11.9
Marital status	Married	144	81.8
	Single/widow/divorced	32	182
Chronic diseases	Yes	36	20.5
	No	140	79.5

** Mean ± SD = Mean ± Standard Deviation, Min-Max = Minimum- Maximum*

The duration of treatment in the ICU was 2.68 ± 0.85 days. 35.2% of the patients stated that they could not sleep at night, and the score of feeling tired due to not sleeping was 5.85 ± 1.94. The mean score of the RCSQ was 37.01 ± 17.84, and ICUESS was 131.63 ± 19.18 (Table 2).

Table 2. Clinical and sleep characteristics of patients and the mean score of the scales

	n	**%**
Daytime sleep-in intensive care		
Yes	76	43.2
No	100	56.8
How you woke up this morning		
Waking up spontaneously	59	33.5
Waking up from environmental factors	21	11.9
Waking up while the care and treatment were being done	34	19.3
Couldn't sleep at all	62	35.2
	Mean ± SD	**Min-Max**
Duration of stay in ICU (day)	2.68 ± 0.85	1.00-5.50
Pain	5.94 ± 2.18	1.00-10.00
Fatigue from lack of sleep	5.85 ± 1.94	2.00-9.00
Richard-Campbell Sleep Questionnaire	37.01 ± 17.84	7.00-74.00
ICUESS	131.63 ± 19.18	79.00-166.00

Mean ± SD = Mean ± Standard Deviation, Min-Max = Minimum- Maximum

The RCSQ score of patients who woke up spontaneously in the morning in the ICU was statically higher than those affected by environmental factors such as care, treatment, noise, and light ($F = 41.692$; $p < 0.001$) (Table 3).

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Table 3. Comparison of mean score of the Richard-Campbell Sleep Questionnaire according to demographic and clinical characteristics

Variables		RCSQ	
		Mean ± SD	Statistic
Gender	Female	38.49 ± 17.47	t:0.037
	Male	35.52 ± 18.19	*p*:0.271
Education	Literate	30.67 ± 20.16	
	Primary school	33.38 ± 17.64	F:1.841
	High school	39.55 ± 16.88	*p*:0.142
	University	39.28 ± 20.55	
Marital status	Married	1.16 ± 0.37	t:2.447
	Single/widow/divorced	1.20 ± 0.41	*p*:0.437
Chronic diseases	Yes	1.77 ± 0.42	t:2,232
	No	1.82 ± 0.39	*p*:0.458
Daytime sleep	Yes	1.52 ± 0.50	t:4.191
	No	1.61 ± 0.49	*p*:0.226
Waking up this morning	Waking up spontaneously [a]	51.12 ± 16.93	F:41.692 ***p*:0.000***
	Waking up from environmental factors [b]	37.95 ± 13.55	
	Waking up while the care and treatment were being done [c]	36.97 ± 11.68	
	Couldn't sleep at all [d]	23.27 ± 11.06	

Mean ± SD = Mean ± Standard Deviation, Min-Max = Minimum- Maximum, t = independent t-test, F = One way ANOVA (Statistical significance was at the between a with b, c, d; between b with a, d; between c with a, d; between d with a, b, c)*

In Table 4, there was a statically significant negative correlation between The RCSQ score with the duration of treatment in the ICU ($p < 0.001$), pain ($p < 0.001$), and fatigue ($p < 0.001$). The study found a negative statistically significant correlation between the ICUESS and the RCSQ ($p < 0.001$).

Table 4. The correlation between the Richard-Campbell Sleep Questionnaire with age, duration of treatment, pain, fatigue, and Intensive Care Unit Environmental Stressors Scale

		Age	Duration of stay in the ICU	Pain	Fatigue from lack of sleep	ICUESS
RCSQ	r	-0.129	-0.316*	-0.512*	-0.564*	-0.723*
	p	0.087	**0.000**	**0.000**	**0.000**	**0.000**

** p < 0.001, ICU = Intensive Care Unit, ICUESS = Intensive Care Unit Environmental Stressors Scale*

4. Discussion

Intensive care environments are stressful for patients, so identifying stressors that may cause fear, stress, anxiety, depression, and negative health behaviors in the intensive care process is important in assessing the care needs of patients (Aktaş et al., 2015; Pulak & Jensen, 2016). Intensive care patients, who need sleep and rest more than other patients, often have to be content with little sleep due to the ICU environment. Within this period, nurses have essential roles and responsibilities such as early diagnosis of sleep problems, the reduction of current stressors, and supplying required environmental arrangements to create a therapeutic environment (Demir & Öztunç, 2017). With the developing technology, patients' exposure to environmental stressors in the intensive care setting has also increased. In studies, the reasons for sleep problems were determined as noise (25.8%), light (21.7%), coldness of the environment (21.7%), concerns about the disease (19.2%), foreign environment (19.2%), medical and nursing interventions during sleep hours (16.7%), and the high number of patients in the environment (7.5%) (Gencer & Kumsar, 2020; Pisani et al., 2015; Uğurlu, 2012).

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The ICUs are units with constant lighting, patients, and machines, and the sounds of health workers are high (Gultekin et al., 2018). Our study determined that the sleep quality of patients who woke up due to sounds in the ICU was worse than patients who woke up spontaneously. Demir and Öztunç showed in their study that the quality of sleep of the patients decreased as the sound intensity increased in the ICU (Demir & Öztunç, 2017). In addition, studies have also shown that noise can cause fatigue, difficulty in concentrating, tension headaches, and insomnia (Hsu et al., 2012; Simons et al., 2018). Patient care and sampling for laboratory tests are carried out without interrupting the patient's sleep. Unless it is an emergency, the patient should not be awakened for this. Similar interventions and time adjustments can be made. Furthermore, the noise level can be minimized in single rooms recommended by the remedial intensive care design. The ICU, including isolation rooms, may improve sleep quality with interventions to avoid noise levels and lessen background noise.

In our study, patients who received treatment for more than 72 hours were excluded from the sample to rule out the possibility of delirium. Despite this limited time interval, it was observed that sleep quality decreased as the length of stay in the ICU increased. It is likely that acute physiological changes due to illness, injury, and extrinsic factors may cause abnormal sleep in the ICU patients. Patient comfort should be optimized, and patients should be provided with restorative sleep in the intensive care unit, even for a short period (Pulak & Jensen, 2016; Sundstrøm et al., 2021).

Studies have shown that the pain experienced by patients is the most important stressor in intensive care (Aktaş et al., 2015; Tezcan Karadeniz & Kanan, 2019). In this study, pain was found to affect sleep quality. In pain management, where clinical practice standards and multidisciplinary approaches are essential, intensive care nurses' knowledge about the causes and consequences of pain and pain management plays a key role (Tezcan Karadeniz & Kanan, 2019). Therefore, providing effective pain management by intensive care nurses may help provide quality care and improve the sleep quality of patients.

The study found that sleep quality decreased with increasing fatigue. Fatigue is an important symptom in patients receiving treatment in the intensive care unit (Malik et al., 2022). Patients often complain of fatigue due to lack of sleep. Fatigue and sleep disorders are frequently correlated; however, they can also happen independently of each other Intensive care can cause decreased physical activity and extended daytime sleepiness. It leads to constant changes in the onset and the end of sleep. Sleep-wake patterns may cause the progression of fatigue; thus, sleep quality, sleepiness, and how one feels after waking should be assessed. It is possible to use efficient techniques to treat symptoms like tiredness and sleeplessness while also understanding their causes (Matthews, 2011).

In the study, it was found that patients receiving treatment in the intensive care unit had poor sleep quality and high rates of environmental stressors. It was also found that patients with increased environmental stress scores had poor sleep quality. Gencer and Kumsar (2020) showed that environmental stressors in intensive care affected patients' sleep (Gencer & Kumsar, 2020). The continuous illumination in ICUs causes the light-dark cycle, which contributes to the sleep-wake cycles, to disappear. In addition, frequent diagnosis, treatment and care procedures, and high ambient sound levels are important factors in sleep disruption (Pulak & Jensen, 2016; Zengin et al., 2020). The

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study by Zengin et al. (2020) showed that the most important factor was physical stressors. Wang et al. (2019) showed that sounds generated in intensive care impact sleep quality. Environmental factors such as noise, light, and temperature that cause sleep disturbances are controllable stress factors in the ICU (Gultekin et al., 2018). Using non-pharmacological methods to improve sleep in critically ill adults is recommended. Various means may be used, including noise level controlling, using daily lighting, implementing suitable pharmacological medications, ensuring continuous sleeping periods, psychological care, successful pain management, relaxation, or music therapy (Pulak & Jensen, 2016).

5. Conclusion

As a result of this study, it was posited that the quality of sleep of patients in the ICU was affected by environmental stressors. In addition, it was determined that fatigue and pain affected sleep quality, and environmental factors also affected the patients' waking status in the ICU. In order to minimize stressors in ICUs and to develop methods to cope with stress, the stressor factors in the intensive care environment must first be identified. Eliminating or modifying these factors will contribute positively to treating intensive care patients and their duration of stay in the ICU. Intensive care nurses have an essential role in identifying these stressors.

Authors Contributions

Topic selection: EB, SÇ; Design: EB, SÇ; Planning: EB, SÇ, EEO; Data collection: EEO; Data analysis: EB, SY; Writing the article: EB, SÇ, SY; Critical review: EB, SÇ.

Conflict of Interest

The authors declare there are no conflicts of interest.

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