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# Sleep Quality Among Resident Physicians: A Cross-Sectional Study

## Asistan Hekimlerde Uyku Kalitesi: Kesitsel Bir Çalışma

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ABSTRACT

**Background:** This study aimed to determine the sleep quality and factors affecting it among resident physicians working at a Marmara University Faculty of Medicine and to develop suggestions for improving it.

**Materials and Methods:** This was a cross-sectional study. The research was completed with 430 participants. The sleep quality of the resident physicians was evaluated using the Pittsburgh Sleep Quality Index. The short form of the Depression, Anxiety, and Stress Scale-21 was used to evaluate their psychological status. The chi-square test was used to analyze the data. A logistic regression test was used for the forward analysis.

**Results:** The study included 430 resident physicians, of whom 75.1% had poor sleep quality. Poor sleep quality was significantly more common among residents working more than five shifts per month, those without regular and balanced nutrition, those without hobbies, those exposed to workplace violence or mobbing, and those with higher levels of depression, anxiety, and stress ($p < 0.001$). In the multivariate binary logistic regression analysis, occasionally sleeping in bright light (odds ratio [OR]: 2.15; 95% confidence interval [CI]: 1.25–3.70), not having regular and balanced nutrition (OR: 2.21; 95% CI: 1.15–4.24), and higher depression scores (OR: 1.12; 95% CI: 1.01–1.26) were independently associated with poor sleep quality, whereas receiving psychological support was found to be protective.

**Conclusion:** Given that sleep deprivation among healthcare professionals is associated with increased errors in clinical practice, modifiable factors that affect sleep quality must be identified. This study provides evidence to guide interventions that improve resident physicians' well-being and performance.

**Keywords:** Sleep, sleep quality, assistant physicians, psychological factors

ÖZ

**Amaç:** Bu çalışmanın amacı, Marmara Üniversitesi Tıp Fakültesi'nde görev yapan asistan hekimlerin uyku kalitesini değerlendirmek ve kötü uyku kalitesi ile ilişkili faktörleri belirleyerek iyileştirmeye yönelik öneriler geliştirmektir.

**Gereç ve Yöntemler:** Kesitsel tasarıma sahip bu çalışma, 430 asistan hekim ile gerçekleştirilmiştir. Uyku kalitesi Pittsburgh Uyku Kalite İndeksi ile, psikolojik durum ise Depresyon, Anksiyete ve Stres Ölçeği-21 ile değerlendirilmiştir. Veriler ki-kare testi ile analiz edilmiştir. Bağımsız risk faktörlerini belirlemek için ileri yönlü ikili lojistik regresyon analizi uygulanmıştır.

**Bulgular:** Çalışmaya katılan 430 asistan hekimin %75,1'inde kötü uyku kalitesi saptanmıştır. Katılımcıların yaş ortalaması 28,49 ± 2,86 yıldır. Kötü uyku kalitesi; ayda beşten fazla nöbet tutanlarda, düzenli ve dengeli beslenmeyenlerde, hobiye sahip olmayanlarda, iş yerinde şiddet veya mobbinge maruz kalanlarda ve depresyon, anksiyete ve stres düzeyi yüksek olanlarda anlamlı olarak daha sık görülmüştür ($p$ <0,001). Lojistik regresyon analizine göre; bekar olmak (odds ratio [OR]: 1,72; %95 güven aralığı [GA]: 1,01–2,93), çocuk sahibi olmak (OR: 2,12; %95 GA: 1,06–4,23) ve hobiye sahip olmamak (OR: 2,05; %95 GA: 1,26–3,32) kötü uyku kalitesi açısından daha yüksek risk ile ilişkili bulunmuştur. Ayrıca depresyon açısından riskli olan asistan hekimlerin uyku kalitelerinin daha kötü olduğu belirlenmiştir (OR: 1,12).

**Sonuç:** Sağlık çalışanlarında uyku yetersizliği, klinik uygulamalarda hata riskini artıran önemli bir faktördür. Uyku kalitesini etkileyen değiştirilebilir faktörlerin belirlenmesi, asistan hekimlerin iyi oluşunun ve çalışma performansının geliştirilmesi açısından kritik öneme sahiptir. Bu çalışma, uyku kalitesini iyileştirmeye yönelik müdahale çalışmalarına yol gösterici niteliktedir.

**Anahtar Kelimeler:** Uyku, uyku kalitesi, asistan hekimler, psikolojik faktörler

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## Introduction

Sleep—a state of unconsciousness in which interaction with the outside world is interrupted—occurs during regular periods, and different stimuli can awaken people (1). According to the behavioral definition, sleep is a reversible behavioral state of perceptual disconnection from and unresponsiveness to the environment (2). Sleep disorders are common in society and can cause significant problems in people's lives because of insomnia-associated impairments in cognitive and psychomotor functions, including mood, thinking, concentration, memory, learning, vision, and reaction times (3). These impairments, which negatively affect a person's success at school or work and their social life, marriage, or relationships with others, affect their quality of life (4).

Sleep quality is closely related to work, work environment, and mental illness (5). Long-term stress experienced by healthcare workers in their working environments can cause anxiety, depression, and sleep disorders (6). Sleep disorders are more frequently observed in people working in professions that require shift work, such as healthcare workers, than in the rest of society (7). Shift work can affect health through two main mechanisms: lifestyle disturbances arising from irregular work schedules and pathophysiological effects. Employees are often challenged by work and social stress regarding lifestyle. They may find it more difficult to exercise regularly, eat a healthy diet (as they may tend to eat fast food or infrequently), or maintain a good quality of life (8). The pathophysiology pathway is mainly associated with circadian rhythm disruption and increased oxidative stress (9,10).

Increasing their professional knowledge and skills in their fields of expertise is one of the most essential processes for physicians. This is accomplished by working as a resident physician and receiving training that allows the resident to contribute to the health system's functioning and gain expertise. The number of shifts and working conditions of resident physicians causes sleep loss, fatigue, and decreased work performance (11). Studies have also shown that resident physicians are unable to spare enough time for sleep (12,13). In a study conducted with resident physicians in Türkiye, the rate of poor sleep quality among resident physicians was 55%, and being female, having many shifts, and a long working week were associated with poor sleep quality (14).

The worldwide impact of the Coronavirus Disease 2019 (COVID-19) pandemic continues to threaten the health of all humanity. The increasing number of cases and death rates has turned this epidemic into a global crisis, which has led to significant psychological pressure on healthcare workers (15). Lai et al. (16) conducted a study in China with healthcare professionals and found that being a woman and holding a moderate title were associated with experiencing severe depression, anxiety, and distress, while working on the front lines of the pandemic was an independent risk factor for worse mental health outcomes.

Xiao et al. (17) reported that social support levels, self-efficacy, and sleep quality among healthcare workers treating patients with COVID-19 were significantly and negatively associated with their anxiety and stress levels, and high stress negatively affected sleep quality. Zhang and Li (18) stated that the COVID-19 virus worsened sleep quality, and individuals with poor sleep quality experienced more post-traumatic stress than those who had contact with anyone. In contrast, patients with good sleep quality were less affected.

Studies on the sleep quality of resident physicians in Türkiye are limited. This study was conducted among resident physicians because of the risks they face in fighting diseases.

Our study aims to evaluate the sleep quality and factors affecting it among resident physicians working in a university's faculty of medicine, and to develop recommendations.

## Materials and Methods

### Type of Research

This descriptive, cross-sectional study used a *face-to-face* survey design.

### Study Population

Our study was conducted between September 2021 and December 2021. The study population comprised assistant physicians working at a Marmara University Faculty of Medicine in 2021. There were 27 resident physicians in basic medical sciences, 453 in internal medicine, and 218 in surgical medicine, for 698 residents. After applying the exclusion criteria (unpaid or administrative leave, pregnancy, breastfeeding, or refusal to participate in the research), 84 residents were excluded, leaving us with the remaining 614. The study included 430 participants.

### Measuring Tools

The Pittsburgh Sleep Quality Index (PSQI) (18 questions) and the short form of the Depression Anxiety and Stress Scale (DASS) (21 questions) were used for data collection, along with a 40-question information form prepared by reviewing the literature and assessing sociodemographic characteristics and risk factors. The PSQI is a simple and

valid instrument designed for clinical populations to assess both sleep quality and sleep disturbances that may affect sleep quality. The scale was originally developed by Buysse (19). The validity and reliability study of the Turkish version was conducted by Ağargün (20) in 1996, and the Cronbach's alpha internal consistency coefficient was reported as 0.804.

Levels of depression, anxiety, and stress that may influence participants' sleep quality were assessed using the DASS-21. This scale was originally developed by Lovibond as the 42-item version (DASS-42) in 1995 and subsequently shortened to the 21-item version by Antony et al. (21,22). In the Turkish adaptation study of the short form conducted by Yılmaz et al. (23), the Cronbach's alpha internal consistency coefficients were 0.81, 0.80, and 0.75 for the depression, anxiety, and 0.75 for the stress subscale.

The study pre-test was conducted with 10 resident physicians outside the research universe, and the questions were finalized. The last question on the PSQI (the roommate) was not asked because it was not included in the scoring. The participants who gave consent could proceed to other questions. Following the pandemic, data were collected from resident physicians who agreed to participate in the research via an online survey application, through contact numbers prepared in Google Surveys, and through face-to-face surveys.

### Ethical Approval

Ethical approval for our study was obtained from the Clinical Research Ethics Committee of Marmara University (approval number: 09.2021.604, dated: 07.05.2021). Participants were informed about the research and permits before the survey. This study was conducted in accordance with the Declaration of Helsinki.

### Statistical Analysis

Descriptive data are presented as the standard deviation, means, and frequency tables. The chi-square test was used to analyze the data and statistically compare the variables. The normality of the variables was examined using histograms and the Kolmogorov–Smirnov/Shapiro–Wilk tests. A binary logistic regression test (enter likelihood ratio [LR] and backward LR methods) was used as a forward analysis method to assess confusion. The SPSS Statistics 20.0 (Armonk, New York: IBM Corp.) statistical program, in trial version, was used. $p < 0.05$ was considered statistically significant.

## Results

Our study was completed with 430 participants. The mean age of the participants was 28.4 ± 2.8 years, with a median of 28. The minimum and maximum ages are 24 and 50, respectively. While 52.8% of the participants were women, 47.2% were men. 5.1% of the resident physicians work in basic sciences, 64.7% in internal sciences, and 30.2% in surgical sciences.

When the regular and balanced nutritional status and sleep quality of the resident physicians in our study were compared, poor sleep quality was found in 65.9% of those who had a regular and balanced diet, 76.7% of those who had a regular and balanced diet at certain times, and 86.2% of those who had never had a regular and balanced diet. A statistically significant relationship was observed between nutrition and sleep quality ($p < 0.001$).

The relationship between the participants' hobby and their sleep quality was compared. Poor sleep quality was observed in 69.6% of those who engaged in any hobby and 83.1% of those who did not engage in any hobby, and the relationship between having a hobby and sleep quality was found to be statistically significant ($p < 0.001$) (Table 1).

Sleep quality was compared with the responses of the participating assistant physicians to questions about COVID-19. The prevalence of poor sleep quality was 81.0% and 72.1% among resident physicians with and without COVID-19, respectively. A statistically significant relationship exists between them ($p < 0.05$).

Poor sleep quality was reported by 86.2% of those who believed COVID-19 affected their sleep quality and by 66.5% of those who believed it had no effect, and the difference was statistically significant ($p < 0.001$). It is detailed in Table 2.

The relationships between the health status and sleep quality of participants were evaluated. When the depression, anxiety, and stress subscales and sleep quality of the participants were compared according to the DASS-21 scale, the frequency of poor sleep quality was 56% in resident physicians who were not at risk for depression and 87.1% in those at risk. The difference was significant ($p < 0.001$).

The frequency of poor sleep quality was 66.7% in resident physicians who were not at risk for anxiety disorders and 83.6% in those with risk ($p < 0.001$). The frequency of poor sleep quality was 66.0% among resident physicians who are not at risk for stress and 88.5% among those at risk, and the difference was significant ($p < 0.001$).

The relationships between exposure to violence and mobbing and sleep quality were compared between resident physicians participating in our study, both within and outside the work environment. The difference between the participants who were exposed to at least one type of violence in the working environment and those who were exposed to mobbing was statistically significant ($p < 0.001$) (Table 3).

When the relationship between the sleep quality of the participants according to the frequency of sleeping in

the light was compared, poor sleep quality was found to be 64.8% in those who never slept in bright light, 79.7% in those who sleep occasionally, 81.4% in those who sleep frequently in bright light, and 80.0% in those who used to sleep in bright light every day, and the difference was statistically significant ($p < 0.05$).

Resident physicians 'coffee and tea consumption frequencies were categorized as once a week or less and once a day or more. While the frequency of coffee consumption was 68.4% among those who consumed coffee once a week or less, it was 78.2% among those who had one or more cups of coffee per day, and the difference was statistically significant ($p < 0.05$). No significant association was found between the frequency of tea consumption and sleep quality ($p = 0.315$). Sleep quality significantly worsened as the frequency of sleeping out of bed increased ($p < 0.05$) (Table 4). Logistic regression analysis was conducted using variables including COVID-19 diagnosis, nutrition, hobbies, need for psychological support, coffee consumption frequency, mobbing, workplace violence exposure, sleeping in light, sleeping outside the bed, and depression scores. These variables were significant in the univariate sleep quality analyses.

It was found that occasionally sleeping in bright light was 2.150 times more risky (95% confidence interval [CI]: 1.251–3.695), and not eating a regular, balanced diet was

**Table 1. Distribution of sleep quality according to participants' sociodemographic characteristics.**

| n = 430 | | PSQI score | | |
|---|---|---|---|---|
| | | Poor sleep quality | | |
| | | n (%) | n (%) | p-value |
| Sex | Woman | 64 (28.2) | 163 (71.8) | 0.093[a] |
| | Man | 43 (21.2) | 160 (78.8) | |
| Marital status | Married | 48 (27.6) | 126 (72.4) | 0.129[a] |
| | Single | 59 (24.0) | 187 (76.0) | |
| | Divorced | 0 (0.0) | 10 (100.0) | |
| Shift works | Below 5 shifts | 76 (32.3) | 159 (67.7) | **<0.001**[a] |
| | Above 5 shifts | 31 (37.8) | 162 (83.9) | |
| Average number of working hours per week | Below 45 h | 31 (37.8) | 51 (62.2) | **0.003**[a] |
| | Above 45 h | 76 (21.9) | 271 (78.1) | |
| Regular and balanced nutrition | Yes | 44 (34.1) | 85 (65.9) | **<0.001**[a] |
| | No | 23 (13.8) | 144 (86.2) | |
| | Sometimes | 40 (23.3) | 94 (76.7) | |
| Physical activity | Yes | 40 (28.2) | 102 (71.8) | 0.269[a] |
| | No | 67 (23.3) | 221 (76.7) | |
| Have any hobbies | Yes | 77 (30.4) | 176 (69.6) | **<0.001**[a] |
| | No | 30 (16.9) | 147 (83.1) | |

[a]Chi-square test; bold values are statistically significant ($p < 0.05$).
PSQI, Pittsburgh Sleep Quality Index.

**Table 2. Sleep quality of participants according to COVID-19-related conditions.**

| | | PSQI score | | |
|---|---|---|---|---|
| | | Poor sleep quality | | |
| | | n (%) | n (%) | p-value[a] |
| Diagnosis of COVID-19 infection | Yes | 28 (19.0) | 119 (81.0) | **0.044**[a] |
| | No | 79 (27.9) | 204 (72.1) | |
| Effect of COVID-19 on sleep ouality | Yes | 26 (13.8) | 162 (86.2) | **<0.001**[a] |
| | No | 81 (33.5) | 161 (66.5) | |

[a]Chi-square test; bold values are statistically significant ($p < 0.05$).
COVID-19, Coronavirus Disease 2019; PSQI, Pittsburgh Sleep Quality Index.

**Table 3. Sleep quality according to participants' health status and psychological support needs.**

| | | PSQI score | | |
|---|---|---|---|---|
| | | Poor sleep quality | | |
| | | n (%) | n (%) | p-value |
| Chronic disease | No | 88 (26.7) | 242 (73.3) | 0.120[a] |
| | Yes | 19 (19.0) | 81 (81.0) | |
| Psychiatric disease | No | 95 (25.5) | 277 (74.5) | 0.427[a] |
| | Yes | 12 (20.7) | 46 (79.3) | |
| The need for psychological support | No | 58 (34.7) | 109 (65.3) | **<0.001[a]** |
| | Yes, I did | 23 (26.1) | 65 (73.9) | |
| | I needed but did not receive support | 26 (14.9) | 149 (85.1) | |
| Depression | Not risky | 73 (44.0) | 93 (56.0) | **<0.001[a]** |
| | Risky | 34 (12.9) | 230 (87.1) | |
| Anxiety disorder | Not risky | 72 (33.3) | 144 (66.7) | **<0.001[a]** |
| | Risky | 35 (16.4) | 179 (83.6) | |
| Stress | Not risky | 87 (34.0) | 169 (66.0) | **<0.001[a]** |
| | Risky | 20 (11.5) | 154 (88.5) | |
| Violence in the work environment in the last year | Yes | 55 (19.6) | 225 (80.4) | **<0.001[a]** |
| | No | 52 (34.7) | 98 (65.3) | |
| Out of work environment violence in the last year | Yes | 29 (25.7) | 84 (74.3) | 0.823[a] |
| | No | 78 (24.6) | 239 (75.4) | |
| Mobbing | Yes | 21 (14.2) | 127 (85.8) | **<0.001[a]** |
| | No | 86 (30.5) | 196 (69.5) | |

[a]Chi-square test; bold values are statistically significant ($p < 0.05$).
PSQI, Pittsburgh Sleep Quality Index.

**Table 4. The relationship between the participants' habits that may affect their sleep quality and their sleep quality.**

| | | PSQI score | | |
|---|---|---|---|---|
| | | Poor sleep quality | | |
| | | n (%) | n (%) | p-value |
| Frequency of light sleeping | Never | 50 (35.2) | 92 (64.8) | **0.007[a]** |
| | Sometimes | 35 (20.3) | 137 (79.7) | |
| | Often | 16 (18.6) | 70 (81.4) | |
| | Every day | 6 (20.0) | 24 (80.0) | |
| Frequency of sleeping out of bed | Never | 34 (38.6) | 54 (61.4) | **0.002[a]** |
| | Sometimes | 46 (25.3) | 136 (74.7) | |
| | Often | 16 (14.8) | 92 (85.2) | |
| | Every day | 11 (21.2) | 41 (78.8) | |
| Coffee consumption | Less than once a week | 43 (31.6) | 93 (68.4) | **0.028[a]** |
| | More than once daily | 64 (21.8) | 230 (78.2) | |
| Tea consumption | Less than once a week | 30 (28.6) | 75 (71.4) | 0.315[a] |
| | More than once daily | 77 (23.7) | 248 (76.3) | |

[a]Chi-square test; bold values are statistically significant ($p < 0.05$).
PSQI, Pittsburgh Sleep Quality Index.

2.213 times more risky (95% CI: 1.154–4.243) for poor sleep quality. Needing and receiving psychological support was shown to be protective against poor sleep quality. Additionally, a one-unit increase in the depression subscale score of the DASS-21 scale increased the risk of poor sleep quality by 1.124 times (95% CI: 1.005–1.256) (Table 5).

**Discussion**

In our study, the prevalence of poor sleep quality among resident physicians was 75.1%. Studies have evaluated the sleep quality of resident physicians worldwide and in Türkiye. In a sleep quality study conducted with resident physicians in Jordan, 90% of the patients reported poor sleep quality (10). In another study conducted with resident physicians working in clinics in India, this frequency was found to be 65.3% (24). No significant relationship was found between poor sleep quality and gender (Table 1). Similar to our study, in the study by Eyüpoğlu et al. (25) found no relationship between gender and sleep quality, but women had poorer sleep quality. The number of shifts worked by the resident physicians was evaluated (with physicians divided between those who worked less than five shifts and those who worked more than five shifts), and the sleep quality of those who worked more than five shifts was significantly worse (Table 1). In the study by Esen et al. (14), the total sleep quality score increased significantly as the number of seizures per month increased. In the study by Lim et al. (26), sleep quality was worse among 24-hour shift workers than among workers who worked fewer hours. In contrast to our study, a study on the sleep quality of physicians in Bahrain found no significant relationship between sleep quality and physicians who had experienced more than 6 nights of shift work (27).

A significant relationship was found between a lack of a balanced, regular diet and sleep quality among resident physicians (Table 1). The sleep quality of those who did not eat a balanced, regular diet was sometimes worse than that of those who did. Mota et al. (28) found that residents with poor sleep quality did not have a regular, balanced diet, leading to greater weight gain. The importance of resident physicians having hobbies was also stated in this study.

**Table 5. Relationship between participants' descriptive characteristics and poor sleep quality: multivariate analysis findings.**

| | | p-value* | | 95% CI | |
|---|---|---|---|---|---|
| | | | OR | Lower limit | Upper Limit |
| Frequency of light sleeping | Never | **0.048** | | | |
| | Sometimes | **0.006** | 2.150 | 1.251 | 3.695 |
| | Often | 0.185 | 1.596 | 0.800 | 3.183 |
| | Every day | 0.680 | 1.247 | 0.438 | 3.552 |
| Balanced and regular nutrition | Yes | **0.033** | | | |
| | No | **0.017** | 2.213 | 1.154 | 4.243 |
| | Sometimes | 0.859 | 1.054 | 0.588 | 1.888 |
| Need for psychological support | No | **0.027** | | | |
| | Yes, I did | **0.015** | 0.404 | 0.194 | 0.841 |
| | I needed but did not have any support. | 0.951 | 0.980 | 0.522 | 1.840 |
| Have any hobbies | Yes | | | | |
| | No | 0.811 | 1.028 | 0.677 | 1.646 |
| Mobbing | Yes | 0.056 | 1.809 | 0.984 | 3.327 |
| | No | | | | |
| Coffee consumption | Less than once a week | 0.083 | 1.580 | 0.942 | 2.651 |
| | More than once daily | | | | |
| Diagnosis of COVID-19 infection | Yes | 0.103 | 1.574 | 0.912 | 2.716 |
| | No | | | | |
| Depression | | **0.040** | 1.124 | 1.005 | 1.256 |

CI– and CI+ are the lower and upper bounds of the 95% CI, respectively. Variables included in the model: COVID-19 diagnosis, nutrition, hobby, need for psychological support, coffee consumption frequency, mobbing, exposure to violence in the working environment, frequency of sleeping in the light, frequency of sleeping outside the bed, and depression scores.

*The binary logistic regression test (backward LR method) was used.

[a]Chi-square test; bold values are statistically significant ($p < 0.05$).

CI, confidence interval; COVID-19, Coronavirus Disease 2019; LR, likelihood ratio; OR, odds ratio; PSQI.

The sleep quality of resident physicians with hobbies was significantly better than that of non-resident physicians (Table 1). Resident physicians need hobbies that help them escape their work environment and reduce stress and fatigue, thereby supporting their psychological and physical health.

When the frequency of coffee and tea consumption among resident physicians was categorized as once a week or less and once or more a day, those who consumed one or more cups of coffee a day had significantly worse sleep quality (Table 4). Many studies have shown that caffeinated beverage consumption is associated with poor sleep quality. O'Callaghan et al. (29) reported that those who consume caffeinated beverages during the day feel more tired when they wake up the next morning than those who do not. In a study of adults in Australia, sleep quality was significantly worse among those who consumed more caffeine from coffee than among those who did not. No significant relationship was found between sleep quality and the consumption of caffeine-containing beverages, such as tea and energy drinks, which aligns with the findings of our study (30). Sleeping in a bright environment was significantly associated with poor sleep quality. Light exposure during sleep may disrupt the circadian rhythm by suppressing melatonin secretion, thereby adversely affecting sleep quality. In a study by Cho et al. (31), whole-night light exposure acutely altered sleep architecture and brain activity, resulting in shallow sleep, frequent arousals, and reduced power in slow-wave activity and spindle-frequency bands during NREM sleep, as well as decreased theta activity during REM sleep.

In our study, 65% of the participants stated that they had been exposed to at least one type of violence in their work environment over the past year, and verbal violence was reported as the most common type. The frequency of poor sleep quality was significantly higher in those who had been exposed to violence in their work environment (Table 3). A study investigating the relationship between the violence experienced by physicians in their work environment and their sleep quality in China found that physicians were most frequently exposed to verbal violence and that being exposed to violence was significantly associated with poor sleep quality (32). Eriksen et al. (33) included violence experienced in the work environment as a predictor of poor sleep quality for nursing resident physicians. They stated that this violence increased the risk of experiencing poor sleep quality. Niedhammer et al. (34) suggested that exposure to violence in the work environment can quadruple the risk of experiencing sleep problems.

Participants' depression, anxiety, and stress levels were evaluated using the DASS-21 scale. A significant relationship was found between sleep quality and depression, anxiety, and stress levels (Table 3). Lahlouh and Mustafa (10) found a significant relationship between poor sleep quality and depression and anxiety. A study of medical students in Malaysia found that 35% and 24% of students suffered from anxiety and depression, respectively (35). Other studies in the literature have determined a relationship between psychiatric diseases, especially anxiety and mood disorders, and sleep disorders (36,37). While psychiatric diseases can cause sleep disorders, they can also produce psychiatric diseases (38).

Our study found that the frequency of poor sleep quality was significantly higher among resident physicians who had experienced COVID-19 infection (Table 2). Studies in the literature have shown that most patients report at least one COVID-19 symptom even six months after infection. Sleep difficulties are an essential part of these symptoms. Sleep disturbances are quite common even up to 1 year after critical illness resulting from COVID-19, especially after intensive care (39,40). In a case series, subjective worsening of sleep quality was reported in 3 of 4 patients followed for 8 weeks after discharge. Sleep problems, including poor subjective sleep quality, poor sleep latency, and negative changes in daytime function, were detected in the vast majority (85%) of patients recovering from COVID-19 infection (41).

### Study Limitations

Some limitations should be considered when interpreting our study's results. First, the study is insufficiently powered to analyze the cause-and-effect relationship among factors related to sleep quality. The second limitation is that sleep quality was assessed subjectively based on the reports of resident physicians, and clinical examination and evaluation were not performed. Third, when the data were collected between September and December, the resident physicians were at their busiest, and achieving data completeness was difficult. In this context, the approximately 70% participation rate may limit the generalizability of the findings and introduce selection bias.

Fourth, other unmeasured factors may also contribute to the observed associations. Finally, there was selection bias because we excluded participants who did not provide information on study variables (pregnant, lactating, on unpaid leave, or on annual leave longer than one week).

## Conclusion

In our study, poor sleep quality was common among resident physicians. This high frequency was associated with several factors, including the number of shifts experienced, psychological support needs, hobbies, and depression, anxiety, and stress levels. The sleep problems faced by

resident physicians are critical issues that can impact their health and that of their patients.

It is essential to implement regulations regarding working conditions and social aspects of life to address this issue. Resident physicians should be given time to pursue hobbies, working hours must be effectively managed, and legal measures are necessary to protect them from potential violence. Future qualitative studies will allow for a deeper understanding of resident physicians' working conditions. Furthermore, our study will illuminate avenues for future research aimed at mitigating negative factors that may affect this issue, leading to improved sleep quality for resident physicians and, consequently, a higher quality of education and healthcare delivery.

### Ethics

**Ethics Committee Approval:** Ethical approval for our study was obtained from the Clinical Research Ethics Committee of Marmara University (approval number: 09.2021.604, dated: 07.05.2021).

**Informed Consent:** Written informed consent to participate in the study was provided on the questionnaire and in the first question.

### Footnotes

### Authorship Contributions

Concept: S.D., N.E.L., Design: S.D., N.E.L., Data Collection or Processing: S.D., Analysis or Interpretation: S.D., Literature Search: S.D., N.E.L., Writing: S.D.

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