

Sleep Quality and Associated Factors in Hemifacial Spasm

Hemifasial Spazmda Uyku Kalitesi ve Etkileyen Faktörler

Yasemin Ünal¹, Aylin Yeşilgöz², Fatma Genç², Leman İnanç³

¹Bandırma Onyedü Eylül University Faculty of Medicine, Department of Neurology, Balıkesir, Türkiye

²University of Health Sciences Türkiye, Antalya Training and Research Hospital, Clinic of Neurology, Antalya, Türkiye

³Bakırçay University Faculty of Medicine, Department of Psychiatry, İzmir, Türkiye

Abstract

Objective: Hemifacial spasm (HFS) is a hyperkinetic movement disorder characterized by irregular spasms of the muscles innervated by the facial nerve, which continue during sleep. This study aimed to investigate sleep quality and its associated factors in patients with HFS.

Materials and Methods: The study included 67 patients with HFS diagnosis and 59 control subjects. Spasm severity and disease duration were recorded for the patients. Both HFS patients and controls completed the Beck Depression Inventory, Beck Anxiety Inventory, Pittsburgh Sleep Quality Index, Epworth Sleepiness Scale, and Perceived Stress Scale. Subjective sleep latency and sleep efficiency were also recorded.

Results: Compared to controls, HFS patients exhibited higher scores on the Pittsburgh Sleep Quality Index, Beck Depression Inventory, and Perceived Stress Scale, as well as longer sleep latency and lower sleep efficiency. Sleep quality did not correlate with Spasm severity or duration of disease but demonstrated positive correlations with Beck Depression Inventory, Beck Anxiety Inventory, and Perceived Stress Scale scores. The most significant predictor of sleep quality and sleep latency was the Beck Depression Inventory score, whereas the most significant predictors of sleep efficiency were the Beck Depression Inventory and Perceived Stress Scale scores.

Conclusion: In patients with HFS, sleep quality disruption may develop secondary to psychogenic symptoms, primarily depression. During patient monitoring and treatment planning, sleep quality, depression, and other psychogenic factors warrant equal consideration alongside motor findings.

Keywords: Hemifacial spasm, hyperkinetic movement disorders, sleep quality, sleep efficiency, depression, anxiety

Öz

Amaç: Hemifasiyal spazm (HFS), fasial sinir tarafından innerve edilen kaslarda kaslarda uyku sırasında da devam eden düzensiz spazmlarla karakterize hiperkinetik bir hareket bozukluğudur. Bu çalışmada, HFS hastalarında uyku kalitesinin ve ilişkili faktörlerin araştırılması amaçlanmıştır.

Gereç ve Yöntem: Çalışmaya HFS tanısı olan 67 hasta ve 59 kontrol olgu dahil edildi. Hastaların spazm şiddeti ve hastalık süresi kaydedildi. Hem HFS hastaları hem de kontrol grubundaki katılımcılara Beck Depresyon Envanteri, Beck Anksiyete Envanteri, Pittsburgh Uyku Kalitesi İndeksi, Epworth Uykululuk Ölçeği ve Algılanan Stres Ölçeği uygulandı, uyku latansları ve uyku etkinlikleri kaydedildi.

Bulgular: Kontrol grubuyla karşılaştırıldığında, HFS hastalarının Pittsburgh Uyku Kalitesi İndeksi, Beck Depresyon Envanteri ve Algılanan Stres Ölçeği skorları daha yüksek, uyku latansları daha uzun ve uyku etkinlikleri daha düşük bulundu. Uyku kalitesi ile spazm şiddeti veya hastalık süresi arasında ilişki bulunmazken Beck Depresyon Envanteri, Beck Anksiyete Envanteri ve Algılanan Stres Ölçeği puanlarıyla pozitif korelasyon saptandı. Uyku kalitesinin ve uyku latansının en önemli yordayıcısı Beck Depresyon Envanteri puanı iken uyku etkinliğinin en önemli yordayıcısı Beck Depresyon Envanteri ve Algılanan Stres skorları idi.

Sonuç: HFS hastalarında uyku kalitesinde bozulma, başta depresyon olmak üzere psikojenik belirtilere ikincil olarak gelişebilir. Hasta takibi ve tedavi planlamasında uyku kalitesi, depresyon ve diğer psikojenik faktörler, motor bulgular kadar dikkate alınmalıdır.

Anahtar Kelimeler: Hemifasiyal spazm, hiperkinetik hareket bozuklukları, uyku kalitesi, uyku etkinliği, depresyon, anksiyete

Address for Correspondence/Yazışma Adresi: Yasemin Ünal, Bandırma Onyedü Eylül University Faculty of Medicine, Department of Neurology, Balıkesir, Türkiye

E-mail: yaseminunal95@yahoo.com ORCID-ID: orcid.org/0000-0002-6110-9558

Received/Geliş Tarihi: 23.04.2026 Accepted/Kabul Tarihi: 02.09.2026 Epub: 02.10.2026

Cite this article as: Ünal Y, Yeşilgöz A, Genç F, İnanç L. Sleep quality and associated factors in hemifacial spasm. J Turk Sleep Med. [Epub Ahead of Print]



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Introduction

Hemifacial spasm (HFS) is a unilateral hyperkinetic movement disorder characterized by involuntary irregular spasms of muscles innervated by the facial nerve (1). Previous studies have reported that this activity continues at lower levels during sleep, causing sleep disruption (2). In hyperkinetic movement disorders, the presence of non-motor symptoms like depression and anxiety may be associated with sleep disorders. Studies in recent years have emphasized that non-motor symptoms in patients with movement disorders may impact quality of life as significantly as motor findings (3). However, few studies have examined the sleep quality of patients with HFS, and there is insufficient data regarding the correlations between sleep quality and motor symptoms or psychogenic findings. Therefore, this study aimed to investigate sleep quality and associated factors in patients with HFS.

Materials and Methods

The study included 67 patients with HFS (aged 18-80 years) with no other neurological or chronic psychiatric diseases who were being followed up at University of Health Sciences Antalya Training and Research Hospital, Antalya Training and Research Hospital, by a neurologist experienced in movement disorders. In addition, 59 healthy age- and sex-matched individuals were included as a control group. All participants were informed about the study and provided written consent.

Patients were evaluated during a symptomatic period and had not received a botulinum toxin injection for at least three months. Spasm severity was evaluated by the attending neurologist using the 0-4 rating scale described by Jankovic et al. (4) (0: no spasm; 1: mild, hard to notice; 2: mild, no functional impairment; 3: moderate, moderate functional impairment; 4: severe) (4). Disease duration was calculated as the difference between current age and age at disease onset. Patients were also clinically evaluated for cognitive status by the neurologist, and those with cognitive impairment were not included in the study.

Participants in both the patient and control groups completed the Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), and Perceived Stress Scale (PSS). Sleep parameters, including the time it takes to fall asleep after lying down in bed (sleep latency), total sleep duration, total time in bed, and sleep efficiency (sleep duration/time in bed $\times$ 100), were recorded.

The PSQI is a quantitative scale used to evaluate sleep quality. It contains 24 questions, 19 of which are self-reported and used to calculate the index score. These items identify the frequency and severity of subjective problems related to sleep duration, latency, and overall sleep. Total scores range from 0 to 21, with values of 5 or higher indicating poor sleep quality. The scale evaluates subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction (5,6).

The ESS is an 8-item, 4-point Likert scale developed to identify daytime sleepiness in adults. Each item is scored from 0 to 3, yielding a total score between 0 and 24. Higher scores indicate greater daytime sleepiness, and a score of 11 or higher is interpreted as excessive daytime sleepiness (7,8).

The BDI assesses the severity of depressive symptoms of patients. It comprises 21 self-reported items, each scored from 0 to 3. Higher total scores correspond to more severe depressive symptoms (9-11).

The BAI measures anxiety symptoms using a 21-item Likert-type self-report scale. Each item is scored from 0 to 3, with higher total scores indicating more severe symptoms of anxiety (12,13).

The PSS was originally developed by Cohen et al. (14) as a 10-item questionnaire. Its Turkish validity and reliability study, conducted by Bilge et al. (15), removed items 6 and 8 to increase reliability. Therefore, this study utilized the modified 8-item PSS. Each item is rated on a 5-point Likert scale from 0 to 4, with total scores ranging from 0 to 32. The scale includes a stress subscale (items 1, 2, 3, 7, and 8) and a coping subscale (items 4, 5, and 6).

This study was conducted in accordance with the Declaration of Helsinki and was approved by the Bandırma Onyedi Eylül University Health Sciences Non-Interventional Research Ethics Committee (approval no: 2022-203, date: 15.12.2022). All participants provided written informed consent. All scales used in the study have undergone Turkish adaptation with validity and reliability testing.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 20.0 (IBM Corp., Armonk, NY, USA). Python v3.11 was additionally used only to reproduce and verify the multivariable linear regression analyses and to obtain detailed model diagnostics. The normality of continuous variables was evaluated using the Shapiro-Wilk test together with visual inspection of histograms and Q-Q plots.

Continuous variables were presented as mean $\pm$ standard deviation when normally distributed, and as median with interquartile range (IQR) when the normality assumption was not met. Categorical variables were presented as numbers and percentages. Comparisons between the HFS and control groups were performed using the independent samples t-test for normally distributed continuous variables and the Mann-Whitney U test for non-normally distributed variables. Categorical variables were compared using the chi-square test or Fisher's exact test, where appropriate.

For patients with HFS, correlations between disease severity, disease duration, BDI score, BAI score, PSS score, PSQI score, ESS score, sleep latency, and sleep efficiency were evaluated using Pearson or Spearman correlation analysis according to the distributional characteristics of the variables. Pearson correlation analysis was used for normally distributed continuous variables, whereas Spearman's rank correlation analysis was used when at least one variable was ordinal or not normally distributed.

Multivariable linear regression analyses were performed in the patient group to evaluate the independent predictive effects of disease severity, disease duration, BDI score, BAI score, and PSS score on three continuous outcome variables: PSQI score, sleep latency, and sleep efficiency. Separate regression models were also performed for female and male patients.

Regression results were reported as unstandardized regression coefficients, standard errors, t-statistics, 95% confidence intervals, and p values. Model fit was evaluated using R-squared and adjusted R-squared values. Multicollinearity among predictors was assessed using variance inflation factor (VIF) and tolerance values. In addition, regression assumptions were checked by examining residual normality, linearity, homoscedasticity, and influential observations.

Exact p values were reported; values lower than 0.001 were reported as $p < 0.001$. A p value below 0.05 was accepted as statistically significant.

Results

The study included 67 patients with HFS and 59 control subjects. The median age was 61 (IQR: 14) years in the patient group and 56 (IQR: 14.5) years in the control group. The patient group comprised 44 women and 23 men, while the control group included 36 women and 20 men. There were no statistical differences in age or sex between the two groups ($p > 0.05$). Compared to the control group, the HFS group exhibited significantly higher PSQI, BDI, and PSS scores, longer sleep latency, lower sleep efficiency, and lower ESS scores. BAI scores did not differ significantly between the groups (Table 1). In patients with HFS, PSQI scores positively correlated with BDI, BAI, and PSS scores. No significant correlations were identified between PSQI scores and ESS score or disease severity. Sleep latency positively correlated with BDI, BAI, and PSS scores but did not correlate with disease severity or disease duration.

Sleep efficiency negatively correlated with BDI and PSS scores, with no significant correlations observed for BAI score, disease severity, or disease duration (Table 2).

In the multivariable linear regression model for PSQI scores, among the five evaluated variables, only BDI score was a significant predictor of sleep quality [$\beta = 0.253$, $p < 0.001$; 95% confidence interval (CI): 0.135–0.371]. This indicates that higher depression scores were significantly associated with poorer sleep quality (i.e., higher PSQI scores). The remaining variables were not statistically significant (Table 3).

In the sex-stratified regression analyses, BDI score remained a significant predictor of sleep quality for both men and women ($\beta = 0.370$, $p = 0.012$ and $\beta = 0.230$, $p = 0.003$, respectively). While depression exhibited a consistent effect on sleep quality across both sexes, the effect size appeared slightly larger in men (Table 4).

In the analysis of sleep latency, only BDI score emerged as a significant predictor ($\beta = 1.977$, $p < 0.001$; 95% CI: 1.084–2.870). This demonstrates that higher depression scores were strongly associated with prolonged sleep latency. The other variables were not significant (Table 5).

In the sleep efficiency model, both BDI score ($\beta = -1.007$, $p < 0.001$) and PSS score ($\beta = -1.162$, $p = 0.010$) were found to be significant predictors. This suggests that increased depression and stress levels are associated with reduced sleep efficiency, highlighting the strong predictive role of these psychogenic factors (Table 5).

The model fit statistics were as follows: $R^2 = 0.416$ (adjusted $R^2 = 0.368$) for the PSQI model, $R^2 = 0.390$ (adjusted $R^2 = 0.340$) for the sleep latency model, and $R^2 = 0.388$ (adjusted $R^2 = 0.338$) for the sleep efficiency model. VIF values ranged between 1.17 and 1.39, indicating an absence of severe multicollinearity among the predictors.

Table 1. Demographic data, scale scores, and sleep-related characteristics of patients with hemifacial spasm and healthy control subjects.

	HFS group (n = 67)	Control group (n = 59)	p
Age (years)	61.00 (14.00)	56.00 (14.50)	0.460 ^b
Sex (n)			
Female	44	36	0.959 ^c
Male	23	20	
PSQI	5.00 (5.00)	4.00 (3.50)	0.042 ^b
ESS	1.00 (5.00)	4.00 (3.50)	0.010 ^b
Sleep latency (min)	30.00 (33.50)	12.00 (20.00)	<0.001 ^b
Sleep duration (h)	6.36 ± 1.73	7.12 ± 1.37	0.006 ^a
Time in bed (h)	7.50 (1.50)	8.00 (1.75)	0.250 ^b
Sleep efficiency (%)	85.00 (21.16)	92.31 (15.39)	0.001 ^b
BDI	8.00 (9.00)	5.00 (7.00)	0.004 ^b
BAI	6.00 (8.00)	6.00 (7.75)	0.947 ^b
PSS	15.76 ± 4.64	10.17 ± 4.09	<0.001 ^a

HFS: Hemifacial spasm, PSQI: Pittsburgh Sleep Quality Index, ESS: Epworth Sleepiness Scale, BDI: Beck Depression Inventory, BAI: Beck Anxiety Inventory, PSS: Perceived Stress Scale, ^aStudent's t-test, ^bMann-Whitney U-test, ^c χ^2 -test, normally distributed variables are presented as mean ± standard deviation, non-normally distributed variables are presented as median (IQR).

Table 2. Correlation analysis of scale scores, sleep parameters, and clinical characteristics in patients with hemifacial spasm.

		Disease severity	Disease duration	BDI	BAI	PSS
PSQI	r	-0.062	0.144	0.606	0.323	0.481
	p	0.618	0.247	<0.001	0.008	<0.001
ESS	r	0.086	0.040	0.013	0.318	0.053
	p	0.489	0.750	0.916	0.009	0.0673
Sleep latency	r	0.029	0.145	0.597	0.347	0.497
	p	0.813	0.241	<0.001	0.004	<0.001
Sleep efficiency	r	0.136	-0.055	-0.543	-0.107	-0.369
	p	0.272	0.657	<0.001	0.389	0.002

PSQI: Pittsburgh Sleep Quality Index, ESS: Epworth Sleepiness Scale, BDI: Beck Depression Inventory, BAI: Beck Anxiety Inventory, PSS: Perceived Stress Scale.

Table 3. Multivariable linear regression results for the Pittsburgh Sleep Quality Index.

	β	SE	t	p	95% CI
Constant	1.2887	1.5443	0.8345	0.4073	-1.7993 to 4.3768
Disease severity	-0.0586	0.4560	-0.1285	0.8982	-0.9705 to 0.8533
Disease duration	0.0498	0.0589	0.8447	0.4016	-0.0681 to 0.1676
BDI	0.2530	0.0588	4.3003	<0.001*	0.1354 to 0.3707
BAI	0.0273	0.0710	0.3843	0.7021	-0.1148 to 0.1694
PSS	0.2042	0.1073	1.9037	0.0616	-0.0102 to 0.4188

Regression coefficients, standard error, t-statistics and p values for Pittsburgh Sleep Quality Index as outcome variable. *Statistically significant coefficient and effect at 95% confidence level. SE: Standard error, BDI: Beck Depression Inventory, BAI: Beck Anxiety Inventory, PSS: Perceived Stress Scale, CI: Confidence interval.

Table 4. Sex-stratified multivariable linear regression results for the Pittsburgh Sleep Quality Index.

		β	SE	t	p	95% CI
Female	Constant	1.5735	2.3306	0.6752	0.5037	-3.1445 to 6.2916
	Disease severity	-0.1250	0.6296	-0.1985	0.8437	-1.3995 to 1.1496
	Disease duration	0.0713	0.0705	1.0112	0.3183	-0.0715 to 0.2141
	BDI	0.2298	0.0723	3.1777	0.003*	0.0834 to 0.3763
	BAI	0.0062	0.0914	0.0676	0.9464	-0.1789 to 0.1913
	PSS	0.1836	0.1700	1.0804	0.2868	-0.1604 to 0.5277
Male	Constant	1.3486	2.7805	0.4850	0.6339	-4.5178 to 7.2150
	Disease severity	-0.1535	0.7918	-0.1939	0.8486	-1.8241 to 1.5171
	Disease duration	0.0243	0.2135	0.1141	0.9105	-0.4261 to 0.4748
	BDI	0.3702	0.1318	2.8086	0.0121*	0.0921 to 0.6483
	BAI	0.0525	0.1369	0.3835	0.7061	-0.2364 to 0.3414
	PSS	0.1895	0.1450	1.3065	0.2087	-0.1165 to 0.4956

*Statistically significant coefficient and effect at 95% confidence level. SE: Standard error, BDI: Beck Depression Inventory, BAI: Beck Anxiety Inventory, PSS: Perceived Stress Scale, CI: Confidence interval.

Discussion

In HFS, involuntary unilateral tonic or clonic spasms of the facial muscles continue during sleep, unlike in many other movement disorders (16). Although a few polysomnographic studies have shown that spasms decrease during sleep in patients with HFS, they nevertheless persist (2,17). Additionally, 52% of these spasms are accompanied by arousals (2). Studies evaluating sleep quality have demonstrated that patients with HFS have significantly poorer sleep quality compared to controls without movement disorders (3).

In hyperkinetic movement disorders, motor findings are accompanied by non-motor symptoms, and both are linked to poorer quality of life (3,18,19). As a result, it is important to screen for and monitor non-motor findings. In these patients, spasms occurring around the eye and half of the face may cause embarrassment and a feeling of tension in social environments. Involuntary eye closure can lead to functional vision loss and difficulties in working life, while the involvement of perioral muscles can cause speech disturbances. All of these processes may contribute to the emergence of psychogenic symptoms

Table 5. Multivariable linear regression results for sleep latency and sleep efficiency.

		β	SE	t	p	95% CI
Sleep latency	Constant	-4.1593	11.7212	-0.3549	0.7239	-27.5972 to 19.2787
	Disease severity	2.7352	3.4613	0.7902	0.4325	-4.1861 to 9.6564
	Disease duration	0.2279	0.4473	0.5095	0.6123	-0.6665 to 1.1223
	BDI	1.9766	0.4466	4.4259	<0.001*	1.0836 to 2.8696
	BAI	0.4206	0.5392	0.7799	0.4384	-0.6577 to 1.4988
	PSS	0.8117	0.8144	0.9967	0.3229	-0.8168 to 2.4403
Sleep efficiency	Constant	97.3094	6.2993	15.4477	<0.001*	84.7132 to 109.9056
	Disease severity	1.0416	1.8602	0.5599	0.5776	-2.6781 to 4.7612
	Disease duration	-0.0799	0.2404	-0.3325	0.7407	-0.5606 to 0.4007
	BDI	-1.0065	0.2400	-4.1934	<0.001*	-1.4864 to -0.5265
	BAI	0.4997	0.2898	1.7242	0.0897	-0.0798 to 1.0791
	PSS	-1.1620	0.4377	-2.6548	0.0101*	-2.0372 to -0.2868

*Statistically significant coefficient and effect at 95% confidence level. SE: Standard error, BDI: Beck Depression Inventory, BAI: Beck Anxiety Inventory, PSS: Perceived Stress Scale, CI: Confidence interval.

such as anxiety and depression (20,21). Although one study did not identify significant differences in depression and anxiety scores compared to healthy controls (3), several other studies have reported that patients with HFS exhibit more depression and anxiety symptoms than controls (21-23). Furthermore, anxiety and stress are among the most important factors associated with the frequency or exacerbation of HFS attacks (20). The interconnected nature of these symptoms may ultimately have an adverse impact on patients' quality of life. Consistent with the literature, our study investigating sleep quality and its associated factors in patients with HFS demonstrated that these patients have significantly higher scores indicating poorer sleep quality compared to healthy controls. Additionally, sleep latency was significantly longer and sleep efficiency was reduced compared to controls. However, no significant correlation was identified between sleep quality and clinical severity. Depressive symptoms and perceived stress scores were significantly higher in patients with HFS compared to controls, whereas anxiety scores did not differ significantly. Significant positive correlations were observed between sleep quality scores and depression, anxiety, and perceived stress scores. These findings suggest that, contrary to common belief, accompanying depression, anxiety, and stress symptoms are more strongly linked to poorer sleep quality than the persistence and severity of spasms during sleep. Moreover, our regression analysis indicated that depressive symptoms were the strongest predictor of poor sleep quality. In light of these findings, addressing the psychogenic profile and sleep quality alongside motor symptom severity during patient monitoring and treatment planning may be crucial for improving the overall quality of life of these patients.

Study Limitations

A limitation of this study is that patients were evaluated exclusively during a symptomatic period prior to botulinum toxin injection. Previous studies have indicated that anxiety and depression symptoms can resolve following botulinum

toxin injections (21,23). In the present study, we did not assess whether botulinum toxin administration altered the correlation of sleep quality and psychogenic symptoms, which may be a topic for future research. Another limitation is that sleep latency and efficiency were not measured objectively but were assessed based on the patients' subjective reports. Finally, an a priori sample size calculation was not performed. The study included all eligible patients with HFS who met the inclusion criteria during the study period. Although the control group was slightly smaller than the patient group, the case-control ratio was close to 1:1, and the groups were well matched in terms of age and sex.

Conclusion

Our findings indicate that, contrary to common belief, the primary factors associated with poorer sleep quality in patients with HFS are psychogenic symptoms rather than motor findings. Among these, depressive symptoms showed the strongest association. Additionally, depressive symptoms were independently associated with sleep latency, while both depressive symptoms and perceived stress were linked to reduced sleep efficiency. Sleep quality, sleep latency, and sleep efficiency were independent of disease duration and spasm intensity. Further studies involving diverse populations are needed to corroborate these findings. During follow-up and treatment planning for patients with HFS, the assessment and management of sleep quality and psychogenic conditions are important to increase patients' quality of life. Therefore, these non-motor symptoms warrant equal consideration alongside motor findings.

Ethics

Ethics Committee Approval: This study was conducted in accordance with the Declaration of Helsinki and was approved by the Bandırma Onyedi Eylül University Health Sciences Non-Interventional Research Ethics Committee (approval no: 2022-203, date: 15.12.2022).

Informed Consent: All participants provided written informed consent prior to the study.

Acknowledgements

We would like to thank Ersin Yılmaz for his assistance with the statistical analysis, which greatly enhanced the quality of our results.

Footnotes

Authorship Contributions

Surgical and Medical Practice: A.Y., F.G., Concept: Y.Ü., Design: Y.Ü., L.I., Data Collection or Processing: Y.Ü., A.Y., F.G., Analysis or Interpretation: Y.Ü., L.I., Literature Search: Y.Ü., Writing: Y.Ü.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

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