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The Prevalence and Impact of Insomnia in Multiple Sclerosis

Multipl Sklerozda İnsomnia Prevalansı ve Etkisi

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Abstract

Objective: In this study, the prevalence of insomnia and the effects of factors such as depression, anxiety, and fatigue on sleep and quality of life in patients with relapsing-remitting multiple sclerosis (RRMS) were investigated.

Materials and Methods: One hundred and five RRMS patients and 105 healthy control groups were examined. Insomnia, depression, anxiety, sleep and life qualities and fatigue were evaluated with scales.

Results: The insomnia prevalence was higher in MS patients than in the control group (31.7% vs. 17.1%, p=0.014). Fatigue, anxiety and depression levels increased in MS patients, and sleep and life qualities were significantly impaired (p<0.001). Fatigue, anxiety and depression levels were higher in female patients than in males, while quality of life was lower (p<0.001). It has shown an increasing effect on depression and anxiety levels, insomnia and deterioration in sleep quality.

Conclusion: Factors that adversely affect sleep and quality of life, especially depression, anxiety and fatigue, should be carefully evaluated in RRMS patients. This emphasizes the importance of individual approaches in clinical management.

Keywords: Multiple sclerosis, insomnia, sleep quality, anxiety, depression

Öz

Amaç: Bu çalışmada, relapsing-remitting multipl skleroz (RRMS) hastalarında insomnia prevalansı ile depresyon, anksiyete, yorgunluk gibi faktörlerin uyku ve yaşam kalitesi üzerinde etkileri araştırıldı.

Gereç ve Yöntem: Yüz beş RRMS hastası ve 105 sağlıklı kontrol grubu incelendi. İnsomnia, depresyon, anksiyete, yorgunluk, uyku ve yaşam kalitesini ölçen ölçeklerle değerlendirildi.

Bulgular: RRMS hastalarında insomnia prevalansı, kontrol grubuna göre daha yüksekti (%31,7 vs. %17,1, p=0,014). RRMS hastalarında depresyon, anksiyete ve yorgunluk düzeyleri artmış, uyku ve yaşam kalitesini belirgin şekilde bozulmuştu (p<0,001). Kadın hastalarda yorgunluk, anksiyete ve depresyon seviyeleri erkeklere göre daha yüksek bulunurken yaşam kalitesi daha düşüktü (p<0,001). Depresyon ve anksiyete düzeyleri, insomnia ve uyku kalitesindeki bozulmayı artırıcı etki göstermiştir.

Sonuç: RRMS hastalarında uyku ve yaşam kalitesini olumsuz etkileyen faktörler, özellikle depresyon, anksiyete ve yorgunluk, dikkatle değerlendirilmelidir. Bu durum, klinik yönetimde bireysel yaklaşımların önemini vurgulamaktadır.

Anahtar Kelimeler: Multipl skleroz, insomnia, uyku kalitesi, anksiyete, depresyon

Introduction

Multiple sclerosis (MS) is a chronic neurological disease. The most frequent subtype of MS is relapsing-remitting MS (RRMS) form.[1] MS patients exhibit a diverse array of symptoms. Additionally, clinical manifestations such as sleep abnormalities, depression, anxiety, fatigue and cognitive decline, which are often overshadowed, are commonly observed. These symptoms negatively impact the quality of life.[2]

Insomnia is defined as difficulty in initiating or maintaining sleep, a reduction in sleep duration or quality, and consequent impairments in daytime physical and/or cognitive activities.[2] While comprehensive epidemiological studies exploring the precise insomnia prevalence in patients with MS are limited, it affects roughly 40-50% of patients.[3] Other factors, such as drug-related side effects and lesion burden, such as with immunotherapy, may contribute to disruption of normal sleep patterns.[4] Psychiatric manifestations such as depression and anxiety are also more common in MS than in the general population and are linked to a reduced life quality, cognitive dysfunction, and higher risk of suicide.[5]

Clinicians' focus on the primary manifestations of MS often leads to the neglect of secondary disability conditions. The

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prevalence of symptoms like sleep disturbances, fatigue, anxiety and depression in MS patients is well-documented; however, their impact on life quality remains insufficiently explored. In our study, we aimed to investigate the association between these symptoms and the prevalence of insomnia with current diagnostic criteria,[6] which is common in MS, and its effects on patients.

Materials and Methods

Consecutively 105 patients with RRMS followed in Neuroimmunology Clinic of University of Health Sciences Türkiye, Antalya Training and Research Hospital between 01/07/2022 and 01/03/2023 were included into the study. The diagnoses were made according to the 2017 McDonald criteria.[7] One hundred-five sex- and age- matched participants with no prior history of psychiatric or neurological conditions except for sleep disorders were included as control group.

Demographic information (age, gender and marital status) and clinical details including MS-related medications of the patient group were recorded.

Both patients and control groups were evaluated for insomnia. Symptoms of urinary dysfunction were also assessed in the patients. The Expanded Disability Status Scale (EDSS) was used for evaluating disease severity.[8] Patients were administered the MS quality of life-54 instrument (MSQOL-54),[9] Fatigue Severity Scale (FSS) for fatigue,[10] Beck Anxiety Inventory for severity of anxiety symptoms,[11] Beck Depression Inventory for severity of depression symptoms,[12] Pittsburgh Sleep Quality Index (PSQI) for sleep quality[13] and Epworth Sleepiness Scale (ESS) for daytime sleepiness.[14]

University of Health Sciences Türkiye, Antalya Training and Research Hospital Clinical Research Ethics Committee (decision number: 16/13, date: 25/08/2022). An informed consent form was signed by each participant prior to the enrollment in the study. Each participant received a comprehensive explanation of the entire procedure and participation in the study was entirely voluntary.

Statistical Analysis

A priori sample size calculation was performed based on the assumption of medium effect size (d=0.50), an alpha level of 0.05, and a statistical power of 95%. Given that the study involves comparisons of scales between MS and control groups, the calculations were conducted for independent samples. Based on these parameters, a minimum of 105 participants per group was required to achieve adequate statistical power. The sample size determination was conducted using a two-tailed t-test model (t-tests-means: difference between two independent means), with the following parameters: non-centrality parameter δ=3.6228, critical t=1.9714, degrees of freedom =208, and actual power =0.9501.

Continuous variables were expressed as mean ± standard deviation or median and minimum-maximum values, while categorical variables were reported as frequency and percentage. The Shapiro-Wilk test was used to assess normal distribution. The categorical variables were analyzed using the Fisher's Exact and Pearson chi-square tests. For continuous variables the Mann-Whitney U test and Kruskal-Wallis test were applied for non-normally distributed data, while the one-way ANOVA test and independent t-test were used for normal distributions. Spearman correlation test was employed to analyze the relationship between disease duration, EDSS and other study parameters in patient group. The data was analyzed using IBM SPSS 23.0 software, with p-values <0.05 considered statistically significant.

Results

In Table 1 the clinical and demographic features of the MS patients and the control groups were summarized. There were no statistically significant differences between the groups regarding gender, age, marital status, or ESS scores. However, MS patients had significantly higher scores for Beck anxiety, Beck depression, FSS, PSQI, while their MSQOL-54 physical, MSQOL-54 cognitive and MSQOL-54 total scores were statistically lower. The median disease duration among MS patients was 7.5 years with a range of 1 to 34 years. Insomnia prevalence was higher in MS patients compared to control group (31.7% vs. 17.1%; p=0.014) and 25.7% of the MS patients reported bladder dysfunction. Table 2 provides comparisons of MS patients' demographic and clinical characteristics based on insomnia presence. Accordingly, age (p=0.786), gender (p=0.451), marital status (p=0.419), duration of illness (p=0.908), EDSS score (p=0.364), type of medication used (p=0.718), ESS score (p=0.464), and presence of bladder dysfunction (p=0.242) did not differ significantly according to the presence of insomnia. Beck anxiety and depression scores were significantly higher in patients with MS with insomnia (p<0.001 and p=0.008). In addition, FSS (p=0.028) and PSQI (p<0.001) scale levels were found to be higher in the MS group with insomnia. MS patients with insomnia had significantly lower MSQOL-54 scale physical, cognitive and total scores.

When the distribution of patients according to the used MS medication was examined, it was observed that 65 patients (62.5%) used first-line drugs and 39 patients (37.5%) used second-line drugs. Dimethyl fumarate (20%) and teriflunamide (16.2%) were the highest in the first-line drug group, while ocrelizumab (11.4%) and natalizumab (9.5%) were the highest in the second-line drug group.

In the patient group with MS, the demographic and clinical characteristics of the patients according to gender are indicated in Table 3. No significant difference in terms of age (p=0.864), marital status (p=0.410), duration of illness (p=0.741), EDSS score (p=0.752), PSQI (p=0.182), ESS score (p=0.159), presence of insomnia (p=0.451) and of urinary dysfunction (p=0.630) according to gender was found. Beck's anxiety and depression levels in the female MS patients were statistically higher than in men (p=0.010 and p=0.008). It was determined that the FSS score of the female MS patient group was higher (p=0.020). MSQOL-54 physical (p=0.003), MSQOL-54 cognitive (p=0.002) and MSQOL-54 total (p=0.002) scale scores were significantly lower in female patients with MS.

In the MS patients, depression, Beck anxiety, FSS, PSQI, MSQOL-54 physical, MSQOL-54 cognitive, MSQOL-54 total scores and

Table 1. Demographic and clinical characteristics of the patient and control groups

	Controls (n=105)	MS patients (n=105)	p
Age (years), mean ± SD	40.18±10.18	41.65±11	0.317
Gender, n (%)			
Female	73 (69.5)	78 (74.3)	0.443
Male	32 (30.5)	27 (25.7)	
Marital status			
Single	28 (26.7)	25 (23.8)	0.634
Married	77 (73.3)	80 (76.2)	
Disease duration (years), median (min-max)	-	7.5 (1-34)	-
Insomnia, n (%)	18 (17.1)	33 (31.7)	**0.014**
Urinary dysfunction	-	27 (25.7)	-
Beck depression, median (min-max)	5 (0-22)	8 (0-39)	<**0.001**
Beck anxiety, median (min-max)	3 (0-35)	8 (0-55)	<**0.001**
FSS, median (min-max)	2.78 (1-7)	4.4 (1-7)	<**0.001**
PSQI, median (min-max)	3 (0-12)	5 (0-18)	<**0.001**
ESS, median (min-max)	3 (0-10)	3 (0-24)	0.226
MSQOL-54 physical, median (min-max)	79.64 (30.05-97.35)	66.51 (17.03-98.67)	<**0.001**
MSQOL-54 cognitive, median (min-max)	74.87 (33.64-94.44)	65.34 (5.8-99.1)	**0.001**
MSQOL-54 total, median (min-max)	152.02 (63.7-186.76)	129.6 (28.43-196.29)	<**0.001**

Independent t-test, Mann-Whitney U test, Pearson chi-square test

EDSS: Expanded Disability Status; FSS: Scale Fatigue Severity Scale, PSQI: Pittsburgh Sleep Quality Index, ESS: Epworth Sleepiness Scale, MSQOL-54: Multiple Sclerosis Quality of Life-54 Instrument, MS: Multiple sclerosis, SD: Standard deviation

presence of insomnia and urinary dysfunction of the patients were compared according to the disease modifying medication used as first- and second- line, and no significant relationship was found between the 2 groups (p>0.05) (Table 4).

In Table 5, the results of the correlation analysis between EDSS score and disease duration and other variables in the patient group with MS are presented. A weak positive correlation was observed between disease duration and FSS (r=0.206; p=0.036). It was found that there was a significant positive correlation between EDSS score and FSS (r=0.325; p=0.001), and PSQI (r=0.219; p=0.025), and a weak negative correlation with MSQOL-54 physical (r=-0.291; p=0.003) subscale score and MSQOL-54 total score (r=-0.223; p=0.022).

Discussion

MS is characterized by a wide range of symptoms and signs that impair physical, psychological functions.[2] Psychiatric comorbidities including sleep disturbances, depression and fatigue contribute to increased disability in MS patients and remain insufficiently addressed in clinical practice. Understanding the impact of these conditions on the quality of life of MS patients is crucial to fostering more comprehensive discussions about their underlying causes and treatment options. Our study contributes to the existing literature by providing a detailed analysis of the impact of insomnia on fatigue, depression, anxiety, and quality of life in MS patients. While previous research has explored these associations, our study strengthens the evidence by utilizing multiple validated scales and conducting comprehensive statistical analysis. Importantly, we found that insomnia significantly exacerbates MS-related fatigue and psychiatric symptoms, emphasizing the need for routine sleep assessments in clinical practice. These findings suggest that insomnia should be recognized as a crucial factor influencing overall disease burden in MS patients, rather than a secondary symptom. Identifying and managing these comorbidities not only enhances the overall quality of life of the patients but also helps mitigate the risk of developing serious health complications.

Insomnia is one of the most prevalent sleep disorders in both the adult and pediatric MS population. The prevalence of insomnia in MS is roughly 40-50% of patients.[2] In our study, the prevalence of insomnia among MS patients was higher than in the healthy population. It was also observed that the sleep quality of the patients was significantly worse than the healthy controls [PSQI; 5 (0-18), p<0.001)].

Our study demonstrated no significant difference in the insomnia prevalence among MS patients based on gender. This finding is supported by several studies in the literature.[15] Nevertheless, some studies have indicated that the prevalence of sleep disorders is higher in female MS patients.[16-18]

Insufficient sleep can worsen patients' life quality and cause problems often experienced in MS, including neurocognitive dysfunction and fatigue. Interrupted sleep may also potentially

Table 2. Demographic and clinical features according to the presence of insomnia in the MS patients

	Insomnia - **(n=72)**	**Insomnia +** **(n=33)**	**p**
Age (years), mean ± SD	41.82±10.97	41.18±11.36	0.786
Gender, n (%)			
Female	51 (71.8)	26 (78.8)	0.451
Male	20 (28.2)	7 (21.2)	
Marital status			
Single	18 (25.4)	6 (18.2)	0.419
Married	53 (74.6)	27 (81.8)	
Disease modifying therapy, n (%)			
First line	45 (64.3)	20 (60.6)	0.718
Second line	25 (35.7)	13 (39.4)	
Disease duration (years), median (min-max)	7 (1-34)	8 (1-26)	0.908
EDSS >3, n (%)	8 (11.3)	6 (18.2)	0.364
Beck depression, median (min-max)	7 (0-32)	17 (1-39)	**<0.001**
Beck anxiety, median (min-max)	6 (0-44)	10 (0-55)	**0.008**
FSS, median (min-max)	4.1 (1-7)	4.7 (2.1-7)	**0.028**
PSQI, median (min-max)	4 (0-16)	9 (2-18)	**<0.001**
ESS, median (min-max)	3 (0-24)	2 (0-15)	0.464
MSQOL-54 physical, median (min-max)	73.8 (17.03-98.67)	52.8 (22.63-84.18)	**<0.001**
MSQOL-54 cognitive, median (min-max)	70.43 (14.46-99.1)	58.63 (5.8-92.09)	**0.005**
MSQOL-54 total, median (min-max)	143.1 (31.49-196.29)	112.04 (28.43-175.55)	**<0.001**
Urinary dysfunction, n (%)	16 (22.5)	11 (33.3)	0.242

Independent t-test, Mann-Whitney U test, Pearson chi-square test, Fisher's Exact test.

EDSS: Expanded Disability Status; FSS: Scale Fatigue Severity Scale, PSQI: Pittsburgh Sleep Quality Index, ESS: Epworth Sleepiness Scale, MSQOL-54: Multiple Sclerosis Quality of Life-54 Instrument, SD: Standard deviation, MS: Multiple sclerosis

contribute to the progression of MS disease. Symptoms such as pain, cramps, bladder dysfunction, or anxiety also contribute to sleep disturbance in MS patients.[19] In our study, there was no statistically significant relationship between the presence of bladder dysfunction and insomnia in patients, but it was observed that the sleep quality of patients with bladder dysfunction was much worse as expected (p=0.018). In previous studies, it has been stated that the likelihood of developing depression is elevated in MS patients with insomnia, and the prevalence of insomnia is very low in patients without depression.[2] Similarly, in our study, as the severity of depression increased, an increase in the incidence of insomnia and a deterioration in sleep quality evaluated by PSQI were observed. As expected, the physical and cognitive health scores of quality of life assessed by MSQOL-54 were significantly lower in the MS patient group with insomnia.

In a study, Stanton et al.[3] examined the sleep patterns of 60 MS patients. The 2 most common causes of insomnia were anxiety (27.5%) and pain (22.5%). In our study, anxiety and depression rating scores were significantly higher in patients with MS with insomnia (p=0.008and p<0.001).

Although the MS patient group reported poor sleep quality in general, there was no significant increase in daytime sleepiness in this group as an expected result. This situation, which has been noted in previous studies, may be the result of patients using fatigue and sleepiness symptoms interchangeably.[17] Patients suffering from insomnia often tend to complain of fatigue rather than sleepiness or a tendency to fall asleep.

Fatigue is a very debilitating symptom that MS patients frequently complain about, with an estimated prevalence of up to 83%.[20] Fatigue in MS is known to be multifactorial and negatively affect mental health, physical activity, mobility and quality of life in MS patients. In our study, the relationship between disease severity, disease duration, insomnia, depression and anxiety with fatigue were evaluated. MS patients reported more fatigue symptoms than healthy controls. The severity of fatigue, as assessed by FSS, was found to be significantly higher in MS patients with anxiety than in those without, and in those with moderate-to-severe depression than those with minimal depression (p<0.001). FSS scores were higher in MS patients complaining of insomnia (p=0.028). In addition, fatigue was found to be associated with disease severity (p=0.001) and duration (p=0.036). A recent large nationwide study on fatigue in MS in the UK found that fatigue is a common problem in MS patients; depression, longer duration of illness, higher EDSS score, and SPMS have been shown to predict fatigue.[21]

When we looked at the literature, we found similar results with our study; In a 2005 study, a model illustrating the relationship

Table 3. Demographic and clinical features according to the gender in the MS patients			
	Female (n=78)	**Male (n=27)**	**p**
Age (years), mean ± SD	41.76±10.28	41.33±13.06	0.864
Marital status			
Single	17 (21.8)	8(29.6)	0.410
Married	61 (78.2)	19(70.4)	
Disease duration (years), median (min-max)	7.25 (1-27)	8(1-34)	0.741
EDSS >3, n (%)	10 (12.8)	4(14.8)	0.752
Insomnia, n *(%)*	26 (33.8)	7(25.9)	0.451
Urinary dysfunction	21 (26.9)	6(22.2)	0.630
Beck depression, median (min-max)	10 (0-39)	4(0-28)	**0.008**
Beck anxiety, median (min-max)	9.5 (0-44)	4(0-55)	**0.010**
FSS, median (min-max)	4.55 (1-7)	3.25(1-6.1)	**0.020**
PSQI, median (min-max)	5 (0-18)	4(0-15)	0.182
ESS, median (min-max)	3 (0-24)	2(0-9)	0.159
MSQOL-54 physical, median (min-max)	62.23 (17.03-98.67)	75.73(33.11-97.27)	**0.003**
MSQOL-54 cognitive, median (min-max)	62 (5.8-99.1)	75.3(29.18-96.78)	**0.002**
MSQOL-54 total, median (min-max)	122.17 (28.43-196.29)	151.05(77.74-191.23)	**0.002**
Independent t-test, Mann-Whitney U test, Pearson chi-square test, Fisher's Exact test. EDSS: Expanded disability status, FSS: Scale Fatigue Severity Scale, PSQI: Pittsburgh Sleep Quality Index, ESS: Epworth Sleepiness Scale, MSQOL-54: Multiple Sclerosis Quality of Life-54 Instrument, SD: Standard deviation			

Table 4. Clinical characteristics according to the drug used in the MS patient group			
	First-line drugs (n=65)	**Second-line drugs (n=39)**	**p**
Beck depression, median (min-max)	9 (0-39)	8(0-32)	0.770
Beck anxiety, median (min-max)	8 (0-55)	8(0-44)	0.872
FSS, median (min-max)	4.45 (1-6.5)	4.4(1-7)	0.436
PSQI, median (min-max)	4 (0-18)	5(1-14)	0.166
ESS, median (min-max)	3 (0-15)	3(0-24)	0.657
MSQOL-54 physical, median (min-max)	67.2 (22.63-98.67)	63.74(17.03-97.45)	0.172
MSQOL-54 cognitive, median (min-max)	65.6 (5.8-99.1)	65.34(14.46-98.84)	0.401
MSQOL-54 total, median (min-max)	135.51 (28.43-195.44)	128.25(31.49-196.29)	0.306
Mann-Whitney U test. EDSS: Expanded disability status, FSS: Scale Fatigue Severity Scale, PSQI: Pittsburgh Sleep Quality Index, ESS: Epworth Sleepiness Scale, MSQOL-54: Multiple Sclerosis Quality of Life-54 Instrument, MS: Multiple sclerosis			

between disease severity, sleep disturbances, fatigue and depression. In this study, the relationships between disease severity, depression, and sleep disturbance in MS and their possible roles in predicting fatigue were investigated and four models were proposed to explore these relationships. In the optimal model, all three have been shown to contribute significantly independently to fatigue in MS, with sleep disturbance making the largest contribution.[22]

Our results indicated that MS patients had a notably lower quality of life compared to healthy controls. This finding is similar to a recently published study.[23] Psychiatric disorders, especially depression, are common in MS and have a considerable effect on life quality. In a study conducted by Lobentanz et al.[24] in 2004, different factors affecting the life quality in a group of MS patients were examined, and it was determined that the main determinant of low quality of life was depression, followed by fatigue and sleep disorders. Similarly, our findings demonstrated that MS patients with mild and moderate-to-severe depression symptoms had a lower quality of life than patients with minimal symptoms ($p<0.001$). A study in the Italian population also showed that depression affects quality of life, consistent with our results.[25] In a study by Spain et al.,[26] the perception of illness itself was found to be an independent predictor of quality of life in patients with MS.

Disease severity and duration have been shown to affect patients' quality of life in MS patients.[23,25] In our study, it was observed that there was a decrease in MSQOL-54 physical health score with an increasing EDSS score ($r=-0.291$; $p=0.003$). However, no significant relationship was observed between disease duration and quality of life. This can be explained by the

Table 5. Correlation between EDSS, disease duration and other parameters in the MS patient group

	Disease duration		EDSS	
	r	p	r	p
Beck depression	0.001	0.996	0.081	0.409
Beck anxiety	-0.008	0.938	0.172	0.080
FSS	0.206	**0.036**	0.325	**0.001**
PSQI	0.126	0.201	0.219	**0.025**
ESS	-0.079	0.422	0.018	0.855
MSQOL-54 physical	-0.102	0.300	-0.291	**0.003**
MSQOL-54 cognitive	0.118	0.231	-0.124	0.207
MSQOL-54 total	0.013	0.894	-0.223	**0.022**

Spearman's correlation coefficient

EDSS: Expanded disability status, FSS: Scale Fatigue Severity Scale, PSQI: Pittsburgh Sleep Quality Index, ESS: Epworth Sleepiness Scale, MSQOL-54: Multiple Sclerosis Quality of Life-54 Instrument, MS: Multiple sclerosis

fact that the majority of our patients with long disease duration have benign MS.

While the EDSS was weakly correlated with the physical health score, it did not correlate with the cognitive health score, the other component of the MSQOL-54 that was measured. Similarly, in the literature, it has been observed that EDSS reflects physical health better than mental health.[27,28] In our study, EDSS was not one of the best predictors of quality of life. Given that the EDSS does not assess key aspects of MS, such as pain, sleep quality and fatigue, this finding is not surprising. While life quality reflects patients' perceptions of their condition from an internal perspective; EDSS is a clinician's assessment based on an external evaluation of the patient's status. Most of the published literature has shown that the level of disability is somewhat related to quality of life.[25,29] Nevertheless, other studies have reported no impact of disability on life quality.[30] In a small number of studies carried out in recent years; it has been reported that in MS patients the life quality is worse than the normal population, and this is especially seen in patients with low EDSS scores.[31] The disability level is undoubtedly a clinically important factor, and it is necessary to measure and follow. However, it should not be forgotten that there are other symptoms that should be evaluated by clinicians.

Our results revealed that the quality of life of women MS patients was significantly lower. Anxiety, depression and fatigue scores were also higher in women. However, in MS patients there is no definitive agreement on how gender impacts the life quality. Some studies indicate that women with MS experience a better quality of life, whereas others suggest the opposite.[23] These conflicting findings may arise from sociocultural variations in the studied populations. Further studies are essential to explore the influence of diverse cultural backgrounds on the factors affecting quality of life in MS patients.

Patients classified as mild and moderate-to-severe depression in our study suffered from poorer sleep quality than those with minimal depressive symptoms. The group of patients with moderate-to-severe anxiety constituted the group with the worst sleep quality. It has also been emphasized in previous studies that sleep disturbance is closely related to depression and anxiety, and that poor sleep quality worsens the aforementioned psychiatric comorbidities.[17,32] In earlier studies it was observed that there was a relationship between the duration of the disease and the severity of depression, but in our study, there was no significant relationship between the duration of the disease and the EDSS score and depression.[23,33]

The use of interferon-β has been associated with worsening of depression.[5] In our study, the relationship between first- and second-line MS drugs and depression, anxiety, fatigue, sleep quality, increased daytime sleepiness and quality of life was examined, but no statistically significant relationship was found. Sleep disorders, fatigue, depression, and anxiety are key factors affecting quality of life. Therefore, it should be evaluated in patient follow-up. Assessing and managing these factors is important in MS patients. Necessary arrangements should be provided by health systems to provide the necessary time and environment for the evaluation of patients in all aspects in polyclinics, and to ensure that the physician-patient relationship can be carried out under safe and sustainable conditions.

Study Limitations

This study has several limitations. First, it was conducted at a single center with a relatively small sample size (n=105 per group), which may affect the generalizability of the findings. Second, the cross-sectional design does not allow for causal inferences. Future multicenter studies with larger cohorts and longitudinal design are warranted to evaluate causality and the longitudinal impact of insomnia in MS-related outcomes.

Conclusion

In our study, MS patients had poorer sleep and life quality compared to healthy controls, and insomnia, fatigue, depression and anxiety were more common in MS patients. In particular, it was noted that female patients were more tired, their depression and anxiety symptoms were more severe, and their life quality was worse. Depression and anxiety in MS patients; it was noted that it worsens sleep and quality of life, increases the severity of fatigue, and increases the incidence of insomnia. Insomnia significantly affects the sleep and quality of life of

MS patients; it was seen to increase symptoms of fatigue, depression and anxiety. Our findings highlight the need for routine sleep disorder screening in MS patients. Given the strong association between insomnia, fatigue, and psychiatric symptoms, clinicians should incorporate sleep assessments into routine MS management to improve patient outcomes. Future studies should further explore targeted interventions for managing sleep disturbances in MS patients. Bladder dysfunction was more prevalent among elderly patients with higher EDSS scores and was found to have a negative impact on both sleep quality and overall quality of life.

There is a need for more large-scale and multicenter studies investigating the prevalence and effects of insomnia in MS patients. Further research should focus on developing targeted interventions for managing insomnia in MS evaluating their effectiveness in clinical practice.

Ethics

Ethics Committee Approval: University of Health Sciences Türkiye, Antalya Training and Research Hospital Clinical Research Ethics Committee (decision number: 16/13, date: 25/08/2022).
Informed Consent: An informed consent form was signed by each participant prior to the enrollment in the study. Each participant received a comprehensive explanation of the entire procedure and participation in the study was entirely voluntary.

Footnotes

Authorship Contributions

Concept: S.Ö., Design: S.Ö., Data Collection or Processing: S.Ö., A.A., Analysis or Interpretation: S.Ö., A.A., Literature Search: A.A., Writing: S.Ö., A.A.
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