Eskisehir Medical Journal
Eskişehir Tıp Dergisi

Eskisehir Med J. 2024; 5(1): 9-13.
doi: 10.48176/esmj.2024.152.

Original Article / Araştırma Makalesi

EVALUATION OF THE RELATIONSHIP BETWEEN SLEEP DISORDERS AND DEPRESSION IN PARKINSON'S DISEASE

PARKİNSON HASTALIĞI'NDA UYKU BOZUKLUĞU VE DEPRESYON ARASINDAKİ İLİŞKİNİN DEĞERLENDİRİLMESİ

MUSTAFA ŞEN[1] **SÜBER DİKİCİ**[2]

[1]Eskişehir City Hospital, Algology, Eskişehir, Turkey
[2]Private Pendik Century Hospital, Neurology, Istanbul, Turkey

ABSTRACT

Introduction: As the severity of the disease increases in Idiopathic Parkinson's Disease (IPD), additional problems such as sleep disorders and excessive daytime sleepiness confront us. In addition, the presence of depression negatively affects the quality of life of the patients with Parkinson's disease. In our study, we have aimed to show sleep disorders and daytime sleepiness in the advanced stages of IPD and their relationships with depression.

Methods: The aim of the study was to examine it with a cross-sectional research method between March 2012 and July 2013. 42 patients diagnosed with IPD and 48 healthy individuals who applied to the Movement Disorders Polyclinic of the Department of Neurology were included in the study. In the IPD group, the disease was graded with the Hoehn&Yahr (H&Y) evaluation scale. In the IPD, and control groups, depression was evaluated with the Hamilton Rating Scale for Depression (HAM-D). night sleep and daytime sleepiness with Parkinson's Disease Sleep Scale (PDSS), and daytime sleepiness with Epworth Sleepiness Scale (ESS). Data were evaluated for age, gender, marital status and compared with those of the control group.

Results: As the ESS scores of the IPD patients included in the study increased dramatically, PDSS scores of these patients decreased significantly (r = -0.615; p = 0.000). As ESS scores increased, the HAM-D scores also increased moderately but significantly (r = 0.388; p = 0.000). It has been also determined that as the PDDS scores increased, the HAM-D and Hoehn-Yahr (H&Y) scale scores decreased significantly with strong correlations between these rating scale scores (r=-0.569 p=0.000 for HAM-D; r=-0.63 p=0.000 for H&Y . As H&Y scale scores increased, a significant increase in HAM-D scores was observed (r = 0.422; p = 0.005).

Conclusion: Sleep disorder may be an important parameter in the general evaluation of and treatment approach to Parkinson's Disease (PD). In addition, depression in PD patients is a psychological problem that must be actively questioned, and treated by physicians when detected.

Key Words: Parkinson's disease; depression; sleeping disorders;

ÖZET

Giriş: İdyopatik Parkinson Hastalığı (İPH)'nda hastalığın şiddeti artıkça uyku bozuklukları, gündüz aşırı uyku hali gibi ek sorunlar karşımıza çıkmaktadır. Ayrıca depresyon varlığı parkinson hastalarının yaşam kalitesini kötü etkilemektedir. Çalışmamızda İPH' ın ileri evrelerinde uyku bozuklukları ile gündüz uykululuk hali ve bunun depresyonla ilişkisini göstermeyi amaçladık.

Yöntemler: Çalışma Mart 2012 ve Temmuz 2013 tarihleri arasında kesitsel araştırma yöntemiyle inceleme amaçlanarak, Nöroloji Ana Bilim Dalı Hareket Bozuklukları Polikliniği' ne başvuran, İPH tanısı alan 42 hasta ve 48 sağlıklı birey çalışmaya alındı. İPH grubunda Hoehn&Yahr (H&Y) Değerlendirme Skalaları ile hastalık derecelendirildi. Hamilton Depresyon Değerlendirme Ölçeği (HAM-D) ile depresyon değerlendirmesi yapıldı. İPH ve kontrol grubuna gece uykusu ve gündüz uyuklamalarının değerlendirildiği Parkinson Hastalığı Uyku Ölçeği (PHUÖ), gündüz uykululuğunun değerlendirildiği Epworth Uykululuk Ölçeği (EUÖ) uygulandı. Hastaların yaş, cinsiyet, medeni durumları değerlendirildi ve kontrol grubu ile karşılaştırıldı.

Bulgular: Çalışmaya alınan İPH' ın EUÖ skoru arttıkça PHUÖ skorunda anlamlı düzeyde azalma gerçekleşmektedir ve bu artışın derecesi güçlü bir düzeydedir (r=-0,615; p=0,000). EUÖ arttıkça HAM-D skorunda anlamlı düzeyde artış gerçekleşmektedir ve bu artışın derecesi orta düzeydedir (r=0,388; p=0,000). PHUÖ değeri arttıkça, Hamilton ve Hoehn-Yahr değerinde anlamlı düzeyde azalma gösterdiği belirlenmiştir ve bu ilişkinin dereceleri güçlüdür. (Hamilton için r=-0,569 p=0,000; Hoehn-Yahr için r=-0,63 p=0,000). H&Y değeri arttıkça HAM-D skorunda anlamlı artış gözlenmektedir (r=0,422; p=0,005).

Sonuç: Parkinson Hastalığının genel değerlendirmesi ve tedaviye yaklaşımında uyku bozukluğu önemli bir parametre olabilir. Ayrıca Parkinson hastalarında depresyon, hekimler tarafından aktif olarak sorgulanması ve saptandığında mutlaka tedavi edilmesi gereken bir ruhsal sorundur.

Anahtar Kelimeler: Parkinson hastalığı, depresyon, uyku bozuklukları

INTRODUCTION

Idiopathic Parkinson's Disease (IPD) is a progressive disorder clinically characterized with resting tremor, cogwheel rigidity, bradykinesia, and impairment of postural reflexes. In addition to these four major findings, autonomic, motor, sensory and cognitive complaints may also be observed. It was first described as "shaking palsy" by the British physician James Parkinson in 1817 (1). In Parkinson's disease, not only physical disorders affect lifestyle, but also non-motor symptoms such as sleep disorders and depression are common complaints that significantly affect the quality of daily life. Sleep disorders are extremely

Corresponding author: Mustafa ŞEN, MD, Eskişehir City Hospital, Algology, Eskişehir, Turkey
E-mail: menings84@gmail.com
ORCID: https://orcid.org/0000-0002-7518-2940
Received date: 08.01.2024 **Accepted date:** 07.02.2024

Cite as: Şen M, Dikici S. Evaluation Of The Relationship Between Sleep Disorders And Depression In Parkinson's Disease. Eskisehir Med J. 2024; 5(1): 9-13. doi: 10.48176/esmj.2024.152.

prevalent in PD patients, and up to 60% of PD patients have sleep disorders (2). Sleep disorders and daytime sleepiness negatively affect patient's daily life and energy (3). Sleep disorders described in IPD include insomnia, characterized by difficulty falling asleep or staying asleep; sleep movement disorders or rapid eye movement (REM) sleep behavior disorders (RDB) characterized by abnormal motor activity during sleep and hypersomnia characterized by respiratory disorders during sleep or daytime sleepiness and/or irresistible sleep attacks. Depression which is one of the common causes of insomnia, is very frequently seen in IPD (4). Complex, and poorly understood interrelationships exist between depression, sleep and fatigue. Insomnia can be a direct result of depression. Although the effects of sleep and depression in IPD patients have not been carefully studied, their impact on clinical condition of the patients has been confirmed in survey studies. In studies performed, sleep disorders have been observed more frequently in patients with IPD and depression (5).

In the light of all this information, our aim in this study is; to reveal the presence of sleep disorders, daytime sleepiness and their relationships with depression in the advanced stages of IPD.

METHOD

The aim of the study was to examine it with a cross-sectional research method between March 2012 and July 2013. 42 patients diagnosed with IPD and 48 healthy individuals who applied to the Movement Disorders Polyclinic of the Department of Neurology were included in the study. Before the research, ethical approval was obtained from the Local Ethics Committee (decision date 09.10. 13, decision number 2013/427. As a control group, age-matched individuals who had not health problems such as neurodegenerative disease, respiratory problems, diabetes mellitus, hypertension and heart failure were included in the study. The severity of depression was graded using the Hamilton depression assessment scale (HAM-D). Parkinson's Disease Sleep Scale (PDSS) was applied to the patient and control groups to evaluate night sleep and Epworth Sleepiness Scale (ESS) was used to evaluate daytime sleepiness. PDSS consists of 15 questions to be answered by the patient. PDSS may evaluate the quality of sleep as a whole throughout the night (question 1), difficulty in starting and continuing sleep (questions 2-3), presence of restless legs syndrome (RLS)-like symptoms at night (questions 4-5), nocturnal psychosis (questions 6-7), nocturia (questions 8-9), nocturnal motor symptoms (questions 10-13), restfulness of sleep (question 14) and daytime napping (question 15). The test is performed by giving a score ranging between 0 (very severe complaints) and 10 (no complaints) for each question. The total score is 150 (no sleep-related complaints). ESS consists of 8 questions, and each of which is evaluated by giving a score between 0 and 3. A total score of 10 or more indicates increased daytime sleepiness, and scores above 15 indicate pathological sleepiness. The same doctor and the same rating scores were used for the evaluations. The data were evaluated according to age, gender, marital status, caregiver and compared with the control group.

Statistical analysis

Chi-square analysis was used to test pairwise correlations between categorical variables. Relationships between age, time to diagnosis, PDSS, ESS, HAM-D scale scores were examined with Pearson correlation coefficient. The statistical significance level was taken as $p<0.05$ and SPSS (ver. 11.5) program was used in the calculations.

RESULTS

The IPD group consisted of 25 (59.5%) male, and 17 (40.5%) female patients, and the healthy control group comprised of 16 (33.3%) male, and 32 (66.7%) female participants. Thirty-two (76.2%), patients, and all (n: 48; 100%) of control subjects were married, while 10 (23.8%) patients were single. The mean (± SD) ages of the patients, and the control subjects were 69.38 (±10.331), and 66.46 (±11.570) years, respectively. Indicated percentages of patients diagnosed with IPD had a H&Y scale score of 1 (31%), and 4 (9.5%). The demographic characteristics of the patients are presented in Table-1.

Descriptive statistics for 9 variables of the patient and control groups and relevant variables between these groups were examined. The mean (± SD) PDSS, ESS and HAM-D scale scores of the patient group were found to be significantly higher than the corresponding scale scores of the control group (for all $p<0.001$). Information is presented in Table-2.

As is seen, the Epworth sleep scale scores increased significantly with age ($r=0.389$; $p<0.0001$), but PDSS scores decreased significantly with age ($r=-0.214$; $p=0.043$). Besides, as the time of diagnosis delayed, HAM-D and

Table 1. Distribution of gender and marital status in patient and control groups

	Gender		Marital Status		Total
	Male	Female	Married	Single	
Patients, n (%)	25 (59.5)	17(40.5)	32 (76.2)	10 (23.8)	42 (100.0)
Control subjects, n (%)	16 (33.3)	32 (66.7)	48 (100.0)	0 (0.0)	48 (100.0)
Total, n (%)	41(45.6)	49 (54.4)	80 (88.9)	10 (11.1)	90 (100.0)

Table 2. Descriptive statistics of patient and control groups in terms of relevant numerical variables

		n	Mean (± SD)	Minimum	Maximum	*p*
Age (years)	Patient	42	69.38(± 10.331)	47	85	0.212*
	Control	48	66.46 (±11.570)	40	89	
PDSS	Patient	42	111.69 (±22.733)	53	141	<0.001*
	Control	48	139.94(±6.019)	130	150	
ESS	Patient	42	6.17(±3.123)	2	15	<0.001*
	Control	48	2.69 (±2.135)	0	8	
HAM-D	Patient	42	10.43(±4.467)	4	24	<0.001*
	Control	48	6.48(±2.790)	2	14	
Time to diagnosis (years)	Patient	42	5.64(±4.355)	1	18	

* Chisquare. Note: This table displays descriptive statistics for each data. The statistics estimated are mean, minimum, maximum and standard deviation (SD). PDSS:P arkinson's Disease Sleep Scale, ESS: Epworth Sleepiness Scale, HAM-D: Hamilton Rating Scale for Depression

Table 3. Correlations between age, time of diagnosis, ESS and H&Y scale scores

		Time of diagnosis	ESS	HAM-D	H&Y	PDSS
Years	r	0.170	0.389	0.090	0.086	-0.214
	p	0.282	<0.0001	0.399	0.587	0.043
	n	42	90	90	42	90
Time of diagnosis	r		0.139	0.318	0.518	-0.476
	p		0.380	0.040	<0.0001	0.001
	n		42	42	42	42
ESS	r			0.388	0.250	-0.615
	p			<0.0001	0.111	<0.0001
	n			90	42	90
HAM-D	r				0,422	-0,569
	p				0,005	<0,0001
	n				42	90
H&Y	r					-,630
	p					<0,0001
	n					42

ESS: Epworth Sleepiness Scale, HAM-D: Hamilton Rating Scale for Depression, H&Y: Hoehn&Yahr, PDSS: Parkinson's Disease Sleep Scale.

Hoehn&Yahr scale scores also increased significantly (r=0.318 p=0.040 for HAM-D; r=0.518 p<0.0001 for Hoehn&Yahr). However, as the time to diagnosis was prolonged, the PDSS scores decreased significantly (r = -0.476; p = 0.001). As the Epworth Sleep scale scores increased, the HAM-D scale scores also increased significantly but moderately (r=0.388; p<0.0001). As the Epworth Sleep scale scores increased, the PDSS scores also decreased dramatically, and significantly (r=-0.615; p<0.0001). It was determined that as the PDSS scores increased, HAM-D and Hoehn&Yahr scale scores decreased significantly, with a strong interrelationship (r=-0.569 p<0.0001 for HAM-D; r=-0.630 p<0.0001 for H&Y). As the H&Y scale scores increased, the HAM-D scale scores increased significantly (r=0.422; p=0.005). The statistical analysis of these findings is summarized in Table-3.

Graphs for examining the relationships between age, diagnosis time, Epworth, Hamilton, H&Y numerical variables are shown in Figures 1,2,3.

DISCUSSION

Sleep disorder is extremely common in IPD and is seen in more than 75% of IPD patients (6). In our study, 84% of these patients had sleep disorders. Chaudhuri et al. (7) applied assessment tools of PDSS and ESS to demonstrate sleep problems in patients with Parkinson's disease and showed that there was a significant difference with this respect between especially the patients in the middle-advanced stage of the disease and the control group. In our study, PD patients had worse scores than the control group in all domains of PDSS. In our study, similar to the

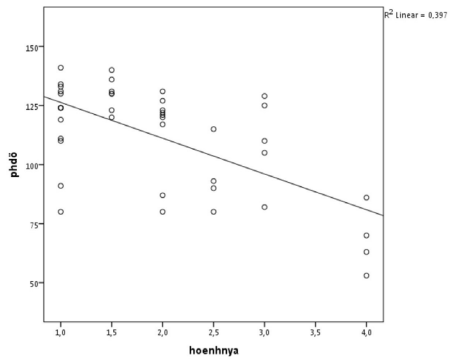

Figure 1. Graph demonstrating the correlation between H&Y and PDSS scores;

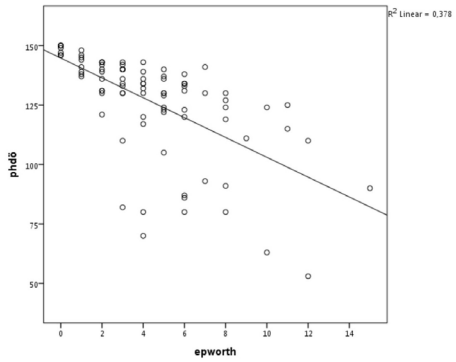

Figure 2. Graph demonstrating the correlation between ESS and PDSS scores;

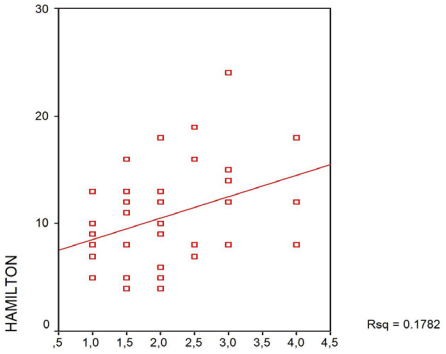

Figure 3. Scatter plot of the correlation between H&Y and HAM-D scale scores

literature, we have determined that as age, age at disease onset, degree of disability (higher Hoehn & Yahr scale scores), and the duration of the disease increased, sleep disorders worsened extremely with resultant increases in PDSS and ESS scores.

Excessive daytime sleepiness and sudden attacks of sleep during the day are also seen at a rate of 10-50% in IPD (8). In the meta-analysis of excessive daytime sleepiness in Parkinson's disease performed in 2021, Fei Feng et al. (9), observed excessive daytime sleepiness in approximately one third of PD patients. It has been found that patients have difficulty maintaining their alertness during a sedentary activity such as reading books or watching television, and if the clinical condition is more severe, sudden sleepiness may occur while eating or driving, which can be very dangerous (10). In our study, based on assessments made with ESS, we found that daytime sleepiness and sudden attacks of sleep were significantly more common in PD patients than in the control group.

A study on depression and major depressive disorder in PD patients suggested that Parkinson's disease may be a stressor for depression, but it does not necessarily trigger its onset. Beck Depression Inventory was used in a study and mild to moderate depressive symptoms had been detected in nearly 40% of the patients (11). Additionally, in another study, the age of onset, severity, duration, stage or subtype of IPD have been related to the time of onset or severity of depressive episodes (12). Similarly, in our study, as the severity of IPD increased and the patients got older, the severity of depression increased in PD patients as also confirmed by higher HAM-D scale scores obtained, consistent with the literature.

A strong and complex relationship exists between sleep and depressive disorders. Just as depression can lead to sleep problems, sleep problems can also cause or accompany depression. Sleep problems have been associated with increased disease severity in patients with depressive disorder (13). Another study has showed that depression is one of the common causes of insomnia and that depression is very common in IPD (14). In our study, the close relationship between insomnia and depression in IPD varied according to the stage of the disease, the age of the patient, and the time of diagnosis, supporting its relationship with sleep disturbance and depression in PD patients.

CONCLUSION

As a result, sleep disorders and frequent daytime naps are observed in IPD, which worsen significantly in parallel with the increase in the duration of the disease and the degree of disability. Sleep disorder may be an important parameter in the general evaluation of the disease and approach to its treatment.

The presence of depression creates diagnostic confusion and negatively affects the severity of Parkinson's disease, making treatment difficult. Therefore, depression in PD patients is a psychological problem that must be actively questioned and treated by physicians when detected. Thus, further negative effects of a psychological problem on the already impaired quality of life of these patients due to PD symptoms, can be prevented.

Additional information: This article is derived from Mustafa Şen's thesis entitled "Evaluation of the relationship between sleep disturbance and depression in Parkinson's Disease". The abstract of the article was presented as Controversial Poster Papers at the 50th National Neurology Congress Antalya 21-27 November 2014, Turkey.

Ethics Committee Approval: The study was approved by Düzce University Education and Research Hospital, Clinical Research Ethics Committee. (Approval date and number date 09.10. 13, 2013/427).

Informed Consent: Informed consent was provided from all patients who wanted participated in the study.

Authorship Contributions: Idea/Concept: MŞ, SD, Design: MŞ, SD, Supervision: MŞ, SD, Data Collection or Processing: MŞ, SD, Analysis or Interpretation: MŞ, SD, Literature Search: MŞ, SD, Writing: MŞ, SD, Critical Review: MŞ, SD, References And Fundings: -, Materials: -.

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

Financial Disclosure: The authors declare that they have no relevant financial.

REFERENCES

1. Palacios-Sánchez L, Torres Nupan M, Botero-Meneses JS. James Parkinson and his essay on “shaking palsy”, two hundred years later. Arq Neuropsiquiatr. 2017;75:671-2.
2. Liu H, Li J, Wang X, et al. Excessive Daytime Sleepiness in Parkinson’s Disease. Nat Sci Sleep. 2022;14:1589-609.
3. Sprajcer M, Owen PJ, Crowther ME, et al. Sleep disturbance in caregivers of individuals with Parkinsonism: a systematic review and meta-analysis. BMJ Open. 2022;12:062089.
4. Stefani A, Högl B. Sleep in Parkinson’s disease. Neuropsychopharmacology. 2020;45:121-8.
5. Suzuki K, Mivamoto M, Matsubara T. Detection and management of sleep disturbances in Parkinson’s disease. Nihon Rinsho. 2017;75:125-35.
6. Factor S.A., McAlarney T., Sanchez-Ramos J.R., Weiner W.J. Schlafstörungen und Schlafeffekte bei der Parkinson-Krankheit. Mov Disord 1990;5:280-5.
7. Chaudhuri KR, Pal S, DiMarco A, et al. The Parkinson’s disease sleep scale: a new instrument for assessing sleep and nocturnal disability in Parkinson’s disease. J Neurol Neurosurg Psychiatry. 2002;73:629-35.
8. Högl B, Seppi K, Brandauer E, et al. Increased daytime sleepiness in Parkinson’s disease: a questionnaire survey. Mov Disord. 2003;18:319-23.
9. Feng F, Cai Y, Hou Y, Ou R, Jiang Z, Shang H. Excessive daytime sleepiness in Parkinson’s disease: A systematic review and meta-analysis. Parkinsonism Relat Disord. 2021;85:133-40.
10. Baumann C, Ferini-Strambi L, Waldvogel D, Werth E, Bassetti CL. Parkinsonism with excessive daytime sleepiness--a narcolepsy-like disorder?. J Neurol. 2005;252:139-45.
11. Inoue T, Kitagawa M, Tanaka T, Nakagawa S, Koyama T. Depression and major depressive disorder in patients with Parkinson’s disease. Mov Disord. 2010;25:44-9.
12. Marsh L, McDonald WM, Cummings J, Ravina B. NINDS/NIMH Work Group on Depression and Parkinson’s Disease. Provisional diagnostic criteria for depression in Parkinson’s disease: report of an NINDS/NIMH Work Group. Mov Disord. 2006;21:148-58.
13. Aydın H. Uyku ve Bozuklukları. Ankara, Hekimler Yayın Birliği; 2007.
14. Lees, A.J.,Blackburn, N.A.Campbell, V.L. The nighttime problems of Parkinson’sdisaese Clin Neuropharmacol.1988;11:512-9.