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EC NEUROLOGY
Research Article

"RU-SATED": A Case-Control Study to Assess Sleep Health in Patients with Parkinsonism

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Received: January 20, 2024; **Published:** February 12, 2023

Abstract

Background: Parkinson's disease affects 1 - 2% of the population over 60 years of age. 80% of patients with PD experience sleep disturbances which are generally overlooked or underreported.

Methods: Case-control study conducted in tertiary care teaching hospital in Northern-east Rajasthan over 6 months (February 2023 to August 2023). A total of 50 patients were included in the study by convenient random sampling along with an age and sex-matched control population of 50. Sleep health assessment was done using RU-SATED questionnaire using the interview method. The data was compiled in MS Excel sheet and SPSS 20 was used.

Results: Out of a total of 50 patients, there were 41 males and 9 females. Mean age of the study population was 61.67 years. The mean age of onset of the disease was 58.34 years and mean duration of the disease was 2.51 years. Sleep regularity was disturbed maximum in patients with PSP (66.66%) followed by MSA (30%), IPD (14.81%) and least in patients with secondary parkinsonism (14.28%). Patients with IPD were found to be more satisfied with their sleep (29.62%) and it was least in PSP (16.66%). 37.03% patients with IPD, 70% of patients with MSA whereas 66.66% with PSP had frequent awakening or difficulty in falling asleep after awakening in between 2 A.M. and 4 A.M. 18.51% patients with IPD, 60% with MSA and 83.33% with PSP found difficulty in falling asleep within 30 mins after going to bed. 62.96% patients with IPD had sleep of 7 to 9 hours per day whereas none of MSA and PSP groups had such a duration of sleep suggestive decreased duration and fragmentation of sleep.

Conclusion: Sleep is an important non motor symptom which is generally under-reported and it should be addressed adequately while treating patients with parkinsonian spectrum disorders.

Keywords: *Sleep Disorders; Idiopathic Parkinson Disease; Multisystem Atrophy; Progressive Supranuclear Palsy; RU-SATED Questionnaire*

Introduction

Parkinson's disease affects 1 - 2% of the population over 60 years of age [1]. Parkinson's disease (PD) is an alpha-synucleinopathy that leads to prominent motor symptoms including tremor, bradykinesia, and postural instability. Nonmotor symptoms including autonomic, neurocognitive, psychiatric symptoms, and sleep disturbances are also seen frequently in PD [2]. Sleep complaints experienced by patients, however, appear to be underdiagnosed. Although 80% of patients with PD experience sleep disturbances, as many as 30% will not discuss it with their healthcare providers [3,4]. In a community-based study of sleep disorders in PD, 32% complained of difficulty falling asleep, 39% reported frequent awakenings during the night, and 23% reported early morning awakenings [5]. To address this study was conducted in North East Rajasthan in India.

Methodology

The present study was a case-control study conducted in the Department of Neurology of a tertiary care teaching hospital in Northern-east Rajasthan over 6 months (February 2023 to August 2023) after obtaining approval from the Institutional Ethics Committee (MGMC&H/IEC/JPR/2023/1724). The data was compiled in MS Excel sheet and SPSS 20 was used. Descriptive statistics was used to represent the results. A total of 50 patients were included in the study by convenient random sampling along with an age and sex-matched control population of 50. Sleep health assessment was done using RU-SATED questionnaire using the interview method. One of the authors (HK) independently applied the questionnaire. RU-SATED questionnaire included the following questions: 1. Regularity - Do you go to bed and get out of bed at the same time (within one hour) every day? 2. Satisfaction - Are you satisfied with your sleep? 3. Alertness - Do you stay awake during whole day without dozing? 4. Timing - Are you asleep in between 2 am to 4 am? 5. Efficiency - Do you spend less than 30 minutes awake in night? 6. Duration - Do you sleep between 7 to 9 hours per day? These questions are rated on a scale of 0 to 2, 0 for never or rarely, 1 for sometimes and 2 for usually or always. The total score for all these items ranges between 0 to 12 where score near 0 indicates poor sleep health and scores inclined towards or near 12 denote a good sleep health.

Results and Discussion

A total of 50 patients of parkinsonian spectrum were recruited in the study. The patients included were Idiopathic Parkinson Disease (n = 27), Multisystem Atrophy (MSA) which included MSA-Cerebellar type (MSA-C) (n = 5) and MSA-Parkinsonian type (MSA-P) (n = 5), Progressive Supranuclear Palsy (PSP) which included PSP-Frontotemporal dementia variant (PSP-FTD) (n = 2), PSP-Oculomotor variant (PSP-OM) (n = 1), PSP-Parkinsonian variant PSP-P) (n = 3), Secondary parkinsonism including hepatic failure (n = 2), drug-induced parkinsonism (n = 3), and vascular parkinsonism (n = 2). There were 41 males and 9 females in the study. The mean age of the study population was 61.67 years. The mean age of onset of the disease was 58.34 years and mean duration of the disease was 2.51 years. Amongst control group, there were 41 (82%) male and 9 (18%) females. The mean age in control group was 59.69 years. The most common comorbidity in both the groups was hypertension (62% in cases and 78% in controls) followed by diabetes (54% in cases and 64% in controls). Table 1 shows the clinicodemographic profile of the patients with parkinsonian features and controls.

On administering "RU-SATED" questionnaire on patients with parkinsonian disorders as well as controls.

Table 2 shows the responses on RU-SATED questionnaire of parkinsonian subtypes.

Table 3 shows the comparison of responses of case and control groups. The clinical severity was assessed using the rating scales for these disorders UPDRS, UMSARS and PSPRS.

Total patients (n)	**50 (100%)**
Idiopathic Parkinson disease	27 (54%)
Multisystem Atrophy	10 (20%)
Progressive Supranuclear Palsy	6 (12%)
Secondary Parkinsonism	7 (14%)
Males	41 (82%)
Females	9 (18%)
Mean Age	61.67 years
Comorbidities	
Hypertension	31 (62%)
Diabetes Mellitus	27 (54%)
Coronary artery disease	12 (24%)
Anemia	1 (2%)
Liver disease	2 (4%)
Thyroid disorder	1 (2%)
Mean Age of onset of disease	58.34 years
Mean Duration of disease	2.51 years
Mean MMSE Score	19.6
Mean UPDRS Score	58.9
Mean PSPRS Score	68.4
Mean MSARS Score	45.6
Total controls (n)	**50 (100%)**
Males in Control group	41 (82%)
Females in control group	9 (18%)
Mean Age of Control Group	59.69 years
Comorbidities	
Hypertension	39 (78%)
Diabetes Mellitus	32 (64%)
Coronary artery disease	5 (10%)
Anemia	3 (6%)
Liver disease	0 (0%)
Thyroid disorder	1 (2%)
Neoplasm	1 (2%)
Others	0 (0%)

Table 1: *Shows the clinicodemographic profile of the patients with parkinsonian features and controls.*

Clinical phenotype	Score	Regularity n (%)	Satisfaction n (%)	Alertness n (%)	Timing n (%)	Efficiency n (%)	Duration n (%)
Idiopathic Parkinson disease (n = 27)	0 Never	4 (14.81%)	4 (14.81%)	11 (40.74%)	10 (37.03%)	5 (18.51%)	6 (22.22%)
	1 Sometimes	13 (48.14%)	15 (55.55%)	12 (44.44%)	12 (44.44%)	9 (33.33%)	4 (14.81%)
	2 Always	10 (37.03%)	8 (29.62%)	4 (14.81%)	5 (18.51%)	13 (48.14%)	17 (62.96%)
Multisystem atrophy (n = 10)	0 Never	3 (30%)	6 (60%)	5 (50%)	7 (70%)	6 (60%)	7 (70%)
	1 Sometimes	5 (50%)	2 (20%)	3 (30%)	2 (20%)	4 (40%)	1 (1%)
	2 Always	2 (20%)	2 (20%)	2 (20%)	1 (10%)	0 (0%)	2 (20%)

Progressive supranuclear palsy (n = 6)	0 Never	4 (66.66%)	3 (50%)	3 (50%)	4 (66.66%)	5 (83.33%)	1 (16.66%)
	1 Sometimes	2 (33.33%)	2 (33.33%)	3 (50%)	1 (16.66%)	1 (16.66%)	1 (16.66%)
	2 Always	0 (0%)	1 (16.66%)	0 (0%)	1 (16.66%)	0 (0%)	4 (66.66%)
Secondary Parkinsonism (n = 7)	0 Never	1 (14.28%)	1 (14.28%)	3 (42.85%)	2 (28.57%)	2 (28.57%)	2 (28.57%)
	1 Sometimes	5 (71.42%)	4 (57.14%)	2 (28.57%)	4 (57.14%)	3 (42.85%)	4 (57.14%)
	2 Always	1 (14.28%)	2 (28.57%)	2 (28.57%)	1 (14.28%)	2 (28.57%)	1 (14.28%)

Table 2: *Responses on "RU-SATED" questionnaire.*

Sleep health parameters	**Patients with Parkinsonism**			**Control Group**		
	Never	**Sometimes**	**Always**	**Never**	**Sometimes**	**Always**
	n (%)	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**
Regularity (n = 50 each group)	12 (24%)	25 (50%)	13 (36%)	2 (4%)	12 (24%)	36 (72%)
Satisfaction (n = 50 each group)	14 (28%)	23 (46%)	11 (22%)	5 (10%)	16 (32%)	29 (58%)
Alertness (n = 50 each group)	22 (44%)	20 (40%)	8 (16%)	3 (6%)	7 (14%)	40 (80%)
Timing (n = 50 each group)	23 (46%)	19 (38%)	8 (16%)	1 (2%)	1 (2%)	48 (96%)
Efficiency (n = 50 each group)	18 (36%)	17 (34%)	15 (30%)	4 (8%)	4 (8%)	42 (84%)
Duration (n = 50 each group)	16 (32%)	10 (20%)	24 (48%)	3 (6%)	8 (16%)	39 (78%)

Table 3: *Comparison of responses in Parkinsonian and control group.*

In the present study, it was found that sleep regularity was disturbed maximum in patients with PSP (66.66%) followed by MSA (30%), IPD (14.81%) and least in patients with secondary parkinsonism (14.28%). Patients with IPD were found to be satisfied with their sleep (29.62%) followed by secondary parkinsonism (28.57%), MSA (20%) and least in PSP (16.66%). 28.57% patients with secondary parkinsonism and 20% of patients with MSA found themselves to be focussed and alert during daytime where only 14.81% patients with IPD and none of PSP patients reported alertness during daytime. When interviewed regarding sleep between 2 A.M. and 4 A.M. 37.03% patients with IPD, 70% of patients with MSA whereas 66.66% with PSP had frequent awakening or difficulty in falling asleep after awakening in between 2 A.M. and 4 A.M. 18.51% patients with IPD, 60% with MSA and 83.33% with PSP found difficulty in falling asleep within 30 mins after going to bed. Assessment of sleep duration was also assessed. 62.96% patients with IPD had sleep of 7 to 9 hours per day whereas none of MSA and PSP groups had such a duration of sleep suggestive decreased duration and fragmentation of sleep. Patients taking amantadine in night found to have difficulty in falling asleep due to better attention and arousal. On the other hand, patients with total cumulative dose of levodopa carbidopa ≥ 625 mg had excessive daytime sleepiness and difficulty in remaining alert during day. Nocturia, restless leg symptoms, sleep terrors and choking episodes as seen in PSP, MSA and in advanced IPD also affect sleep between 2 A.M. and 4 A.M. Sleep quality was effective more in males as compared to females, but this can be attributed also to larger proportion of male patients in study.

The findings are in coherence with study by Stavitsky K group in which they found that advanced stage of parkinsonian phenotype measured by motor symptoms had an inverse correlation with sleep quality. Men had worse sleep as compared to women and had excessive daytime sleepiness as concluded by the current study [6]. Also, As evidenced by Lin JY and group, sleep disordered breathing and antiparkinsonian drugs along with male sex and advanced UMSARS score were poor prognostic factors in relation to sleep quality [7]. Alster P group found that patients with PSP had decreased overall sleep duration, multi-fragmented sleep along with excessive sleep

disturbance. Sleep disturbance is also attributed as a marker of onset of advanced neurodegeneration in all these disorders. Various mechanisms have been described such as neuroinflammation, deposition of alpha-synuclein and the role of glymphatic dysfunction for the development of sleep disturbance. As compared to the normal population there was found a statistically significant difference in sleep regularity, sleep satisfaction, total sleep duration, sleep efficiency, sleep timing as well as alertness during day ($p < 0.05$). Comparison in between typical and atypical parkinsonism as well as with normal population from this region makes this study one of its kind. This study will serve as an add-on to existing literature regarding sleep disturbances in such patients. However, small sample size is the major limitation of the study.

Conclusion

In conclusion, sleep is an important non-motor symptom that needs to be addressed while attending to patients with parkinsonism, especially in the outpatient setting. Various factors affect the sleep health of these patients including the age, disease itself, and drugs used to treat these disorders. Adequate history should be taken regarding non-motor symptoms including sleep health while attending patients with parkinsonism so that these issues can be treated well on time to improve quality of life in patients with parkinsonism, both typical and atypical.

Conflicts of Interest

None.

Disclosures

None.

Funding Support

Nil.

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Volume 16 Issue 2 February 2024