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# SLEEP DISTURBANCES AND NON-MOTOR SYMPTOMS IN PATIENTS WITH PARKINSON'S DISEASE

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**ABSTRACT**

**Background:** Parkinson's disease is a progressive neurodegenerative disorder in which non-motor symptoms, particularly sleep disturbances, significantly contribute to morbidity and impaired quality of life. Sleep-related problems are frequently underrecognized despite their high prevalence and strong association with other non-motor symptoms. This study aimed to evaluate the prevalence and pattern of sleep disturbances in patients with Parkinson's disease and to analyze their association with non-motor symptoms, disease severity, and quality of life.

**Materials and Methods:** A hospital-based cross-sectional observational study was conducted at RIMS, Ranchi, including 50 patients with clinically diagnosed Parkinson's disease. Demographic details, disease duration, and clinical characteristics were recorded. Sleep disturbances were assessed using validated Parkinson's disease–specific sleep assessment tools, while non-motor symptoms were evaluated using standardized non-motor symptom scales. Disease severity and quality of life were assessed using appropriate rating scales. Data were analyzed using descriptive and inferential statistics, with a p-value <0.05 considered statistically significant.

**Results:** Sleep disturbances were observed in a majority of patients, with insomnia being the most common, followed by excessive daytime sleepiness, REM sleep behavior disorder, and restless legs syndrome. Non-motor symptoms such as depression, anxiety, cognitive impairment, and autonomic dysfunction were highly prevalent. Sleep disturbances were significantly more common in patients with moderate to severe disease and were associated with higher non-motor symptom burden. Patients with sleep disturbances demonstrated significantly poorer quality-of-life scores compared to those without sleep-related problems.

**Conclusion:** Sleep disturbances are highly prevalent in Parkinson's disease and are strongly associated with non-motor symptoms, disease severity, and reduced quality of life. Routine assessment and early management of sleep disturbances should form an integral part of comprehensive Parkinson's disease care.

**Keywords:** Parkinson's disease, Sleep disturbances, non-motor symptoms, Quality of life, REM sleep behavior disorder.

## INTRODUCTION

Parkinson's disease (PD) is a chronic, progressive neurodegenerative disorder traditionally characterized by its cardinal motor manifestations, including bradykinesia, resting tremor, rigidity, and postural instability. However, it is now well recognized that Parkinson's disease is a multisystem disorder with a wide spectrum of non-motor symptoms (NMS) that significantly contribute to disease burden and reduced quality of life. These non-motor manifestations often precede the onset of motor symptoms, evolve throughout the disease course, and may dominate the clinical picture in advanced stages.[1,2]

Among the non-motor symptoms of Parkinson's disease, sleep disturbances represent one of the most prevalent and distressing problems. Sleep disorders

affect up to 60–90% of patients with PD and are frequently underdiagnosed and undertreated in routine clinical practice.[3] Sleep disturbances in Parkinson's disease encompass a broad range of conditions, including insomnia, excessive daytime sleepiness, rapid eye movement (REM) sleep behavior disorder (RBD), restless legs syndrome (RLS), periodic limb movement disorder, sleep-disordered breathing, and circadian rhythm abnormalities.[4] These disturbances may occur independently or in combination, leading to fragmented sleep architecture and impaired restorative sleep.

The pathophysiology of sleep disturbances in Parkinson's disease is complex and multifactorial. Neurodegeneration involving dopaminergic and non-dopaminergic pathways, particularly within the brainstem, hypothalamus, and thalamocortical circuits, plays a crucial role in the disruption of sleep–wake regulation.[5] Additionally, motor symptoms such as nocturnal akinesia, rigidity, tremor, and dyskinesias may interfere with sleep continuity. Pharmacological treatments for Parkinson's disease, especially dopaminergic therapies, can further exacerbate sleep problems by causing insomnia, vivid dreams, hallucinations, or excessive daytime sleepiness.[6]

Non-motor symptoms beyond sleep disturbances, including cognitive impairment, depression, anxiety, autonomic dysfunction, fatigue, pain, and sensory disturbances, are highly prevalent in Parkinson's disease and often coexist with sleep disorders. There is growing evidence suggesting a bidirectional relationship between sleep disturbances and other non-motor symptoms. Poor sleep quality has been associated with worsening cognitive performance, mood disorders, increased fatigue, and reduced functional independence in patients with PD.[7] Conversely, neuropsychiatric symptoms such as depression and anxiety may aggravate insomnia and subjective sleep complaints.

REM sleep behavior disorder holds particular clinical significance in Parkinson's disease. RBD is characterized by loss of normal REM sleep atonia, leading to dream-enactment behaviors that may cause injury to the patient or bed partner. It is considered a prodromal marker of synucleinopathies and may precede the diagnosis of Parkinson's disease by several years.[8] The presence of RBD in PD patients has been associated with more severe non-motor symptom burden, faster disease progression, and higher risk of cognitive decline.[9]

Despite increasing recognition of the importance of sleep disturbances and non-motor symptoms in Parkinson's disease, these features are often overshadowed by motor symptoms during clinical evaluation. Failure to identify and manage sleep-related problems and associated non-motor symptoms can lead to significant deterioration in quality of life, increased caregiver burden, and poorer overall outcomes. Standardized assessment tools, such as the Parkinson's Disease Sleep Scale and the Non-Motor Symptoms Scale, have improved the detection of these symptoms, but their routine use remains limited.[10]

Understanding the pattern, severity, and interrelationship of sleep disturbances and non-motor symptoms in patients with Parkinson's disease is essential for comprehensive disease management. Early recognition and targeted intervention may improve sleep quality, alleviate non-motor symptom burden, and enhance overall quality of life. This study aims to evaluate sleep disturbances and associated non-motor symptoms in patients with Parkinson's disease, thereby highlighting the need for a holistic, patient-centered approach in the management of this complex neurodegenerative disorder. The aim of this study is to assess the prevalence and pattern of sleep disturbances and non-motor symptoms in patients with Parkinson's disease and to analyze their association with disease severity, duration, and quality of life, thereby emphasizing the importance of comprehensive non-motor symptom evaluation.

## MATERIALS AND METHODS

**Study Design:** Hospital-based, cross-sectional observational study.

**Study Setting:** Department of Neurology, Rajendra Institute of Medical Sciences (RIMS), Ranchi.

**Study Duration:** 1 year

**Study Population:** Patients diagnosed with Parkinson's disease attending the Neurology outpatient and inpatient services at RIMS, Ranchi.

**Sample Size:** A total of 50 patients with Parkinson's disease were included in the study.

**Inclusion Criteria**

- Patients aged ≥ 40 years.
- Clinically diagnosed cases of Parkinson's disease as per standard diagnostic criteria.
- Patients willing to participate and providing informed written consent.

**Exclusion Criteria**

- Patients with secondary or atypical parkinsonism.
- Patients with severe psychiatric illness or cognitive impairment interfering with assessment.
- Patients with other neurological disorders affecting sleep.
- Patients on medications known to significantly alter sleep patterns unrelated to Parkinson's disease.

**Statistical Analysis:** Data were entered into Microsoft Excel and analyzed using SPSS software version 27.0 (SPSS Inc., Chicago, IL, USA) and GraphPad Prism version 5. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. The unpaired t-test was used to compare continuous variables between independent groups, and the paired t-test was applied for within-

group comparisons. Categorical variables were analyzed using the Chi-square test or Fisher's exact test as appropriate. A p-value of <0.05 was considered statistically significant.

## RESULTS

**Table 1: Demographic Characteristics of Study Participants (n = 50)**

| Variable | Mean ± SD / n (%) |
|---|---|
| Age (years) | 61.4 ± 8.7 |
| Male | 34 (68%) |
| Female | 16 (32%) |
| Duration of disease (years) | 5.6 ± 2.9 |

**Table 2: Prevalence of Sleep Disturbances in Parkinson's Disease**

| Sleep Disturbance | Present n (%) | Absent n (%) | P value |
|---|---|---|---|
| Insomnia | 31 (62%) | 19 (38%) | 0.01 |
| Excessive daytime sleepiness | 27 (54%) | 23 (46%) | 0.03 |
| REM sleep behavior disorder | 18 (36%) | 32 (64%) | 0.04 |
| Restless legs syndrome | 15 (30%) | 35 (70%) | 0.05 |

**Table 3: Non-Motor Symptoms Distribution**

| Non-motor Symptom | Present n (%) | Absent n (%) | P value |
|---|---|---|---|
| Depression | 29 (58%) | 21 (42%) | 0.02 |
| Anxiety | 24 (48%) | 26 (52%) | 0.04 |
| Cognitive impairment | 17 (34%) | 33 (66%) | 0.03 |
| Autonomic dysfunction | 21 (42%) | 29 (58%) | 0.05 |

**Table 4: Association Between Sleep Disturbances and Disease Severity**

| Disease Severity | Sleep Disturbance Present | Sleep Disturbance Absent | P value |
|---|---|---|---|
| Mild (n=18) | 7 | 11 | 0.01 |
| Moderate (n=22) | 15 | 7 | |
| Severe (n=10) | 8 | 2 | |

**Table 5: Relationship Between Sleep Disturbances and Non-Motor Symptoms**

| Parameter | Mean Score ± SD | P value |
|---|---|---|
| NMSS score (Sleep disturbed) | 58.6 ± 12.4 | 0.002 |
| NMSS score (No sleep disturbance) | 41.2 ± 10.8 | |

**Table 6: Comparison of Quality-of-Life Scores**

| Group | Mean PDQ Score ± SD | P value |
|---|---|---|
| With sleep disturbances (n=32) | 46.8 ± 9.3 | 0.001 |
| Without sleep disturbances (n=18) | 32.5 ± 8.1 | |

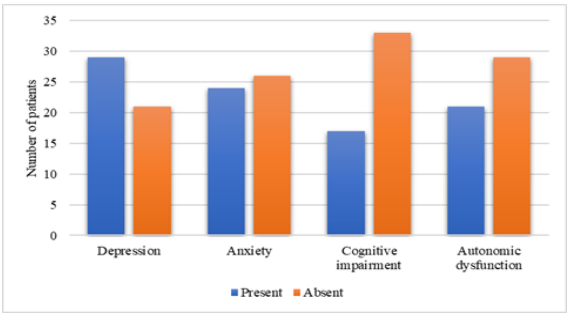


**Figure: 1. Non-Motor Symptoms Distribution**

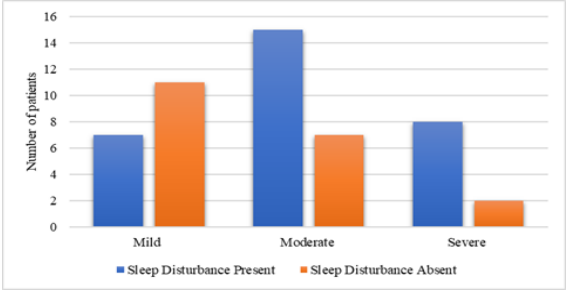


**Figure: 2. Association Between Sleep Disturbances and Disease Severity**

[Table 1] shows the demographic characteristics of the study participants. The mean age of patients was 61.4 ± 8.7 years. There was a clear male predominance with 34 (68%) males and 16 (32%) females. The mean duration of Parkinson's disease among the study population was 5.6 ± 2.9 years.

[Table 2] depicts the prevalence of various sleep disturbances in patients with Parkinson's disease. Insomnia was the most common sleep disturbance, observed in 31 (62%) patients, followed by excessive daytime sleepiness in 27 (54%) patients. REM sleep behavior disorder was present in 18 (36%), while restless legs syndrome was noted in 15 (30%) patients. All sleep disturbances showed statistically significant prevalence ($p < 0.05$).

[Table 3] illustrates the distribution of non-motor symptoms among the study participants. Depression was the most frequently observed non-motor symptom, present in 29 (58%) patients, followed by anxiety in 24 (48%). Cognitive impairment was identified in 17 (34%), while autonomic dysfunction was seen in 21 (42%) patients. The presence of non-

motor symptoms was statistically significant across all parameters ($p < 0.05$).

[Table 4] demonstrates the association between sleep disturbances and disease severity. Sleep disturbances were present in 7 out of 18 patients with mild disease, 15 out of 22 with moderate disease, and 8 out of 10 patients with severe disease. A statistically significant association was observed between increasing disease severity and the presence of sleep disturbances ($p = 0.01$).

[Table 5] compares non-motor symptom burden in patients with and without sleep disturbances. Patients with sleep disturbances had a significantly higher mean NMSS score (58.6 ± 12.4) compared to those without sleep disturbances (41.2 ± 10.8). This difference was found to be statistically significant ($p = 0.002$).

[Table 6] shows the comparison of quality-of-life scores between patients with and without sleep disturbances. The mean PDQ score was significantly higher in patients with sleep disturbances (46.8 ± 9.3) compared to those without sleep disturbances (32.5 ± 8.1), indicating poorer quality of life among affected patients. This difference was statistically significant ($p = 0.001$).

## DISCUSSION

Parkinson's disease is increasingly recognized as a complex neurodegenerative disorder in which non-motor symptoms, particularly sleep disturbances, contribute substantially to morbidity and impaired quality of life. In the present study, sleep disturbances were highly prevalent among patients with Parkinson's disease, with insomnia, excessive daytime sleepiness, REM sleep behavior disorder, and restless legs syndrome being commonly observed. These findings are consistent with previous studies that have reported sleep disorders in more than half of patients with Parkinson's disease, often exceeding the burden imposed by motor symptoms alone.[11,12]

Insomnia emerged as the most common sleep disturbance in this study, affecting 62% of patients. Similar prevalence rates have been reported by Chaudhuri et al., who observed insomnia in approximately 60–65% of Parkinson's disease patients, attributing it to nocturnal motor symptoms, autonomic dysfunction, and neurodegenerative involvement of sleep-regulating centers.[13] Likewise, a study by Breen et al. demonstrated that sleep fragmentation and difficulty maintaining sleep were among the earliest and most persistent sleep-related complaints in Parkinson's disease.[14] Excessive daytime sleepiness, noted in 54% of patients in the present study, has also been widely reported and is often linked to dopaminergic therapy, disease severity, and disrupted nocturnal sleep.[15]

REM sleep behavior disorder was present in 36% of patients in this study, comparable to the prevalence reported by Postuma et al., who found RBD in approximately one-third of patients with established Parkinson's disease.[16] The presence of RBD has been associated with a more diffuse synucleinopathy, greater non-motor symptom burden, and increased risk of cognitive decline. This supports the concept that sleep disturbances may serve as markers of disease progression and severity.

Non-motor symptoms such as depression, anxiety, cognitive impairment, and autonomic dysfunction were highly prevalent in the present study, with depression being the most common. These findings are in agreement with a large multicenter study by Barone et al., which reported depression and anxiety as the most frequently encountered non-motor symptoms in Parkinson's disease, significantly affecting daily functioning and quality of life.[17] The coexistence of sleep disturbances and neuropsychiatric symptoms observed in this study reinforces the bidirectional relationship between sleep and non-motor symptomatology.

A significant association between sleep disturbances and disease severity was observed in the present study, with a higher prevalence of sleep disorders in patients with moderate to severe disease. Similar observations were made by Neikrug and Ancoli-Israel, who reported worsening sleep quality with advancing disease stage, likely due to progressive neurodegeneration and increased motor complications.[18] This highlights the importance of routine sleep assessment, particularly in patients with advanced Parkinson's disease.

Patients with sleep disturbances in the present study demonstrated significantly higher NMSS scores, indicating a greater overall non-motor symptom burden. This finding aligns with the study by Gallagher et al., which showed that poor sleep quality was independently associated with higher non-motor symptom scores and worse functional outcomes.[19] Furthermore, quality-of-life scores were significantly poorer among patients with sleep disturbances, corroborating the findings of Martinez-Martin et al., who emphasized sleep dysfunction as a key determinant of reduced health-related quality of life in Parkinson's disease.[20]

## CONCLUSION

The present study highlights the high prevalence of sleep disturbances and non-motor symptoms among patients with Parkinson's disease and their significant impact on disease severity and quality of life. Insomnia, excessive daytime sleepiness, REM sleep behavior disorder, and restless legs syndrome were commonly observed, with a higher occurrence in patients with moderate to severe disease. Non-motor symptoms such as depression, anxiety, cognitive impairment, and autonomic dysfunction were also frequently encountered and showed a strong association with sleep disturbances. Patients

with sleep-related problems demonstrated significantly higher non-motor symptom burden and poorer quality-of-life scores compared to those without sleep disturbances. These findings emphasize that sleep disturbances are not merely secondary manifestations but integral components of Parkinson's disease. Routine assessment of sleep and non-motor symptoms should be incorporated into clinical practice to ensure comprehensive management. Early identification and appropriate intervention may help improve overall patient well-being, functional outcomes, and quality of life in individuals with Parkinson's disease.

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