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Impact of sleep quality on the quality of life of patients with Parkinson's disease: a questionnaire based study

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ABSTRACT

Objective: Poor sleep quality contributes to the inferior quality of life of patients with Parkinson's disease (PD) despite appropriate treatment of motor symptoms. The literature about the impact of sleep quality on quality of life of patients with PD is as yet sparse.

Material and methods: One hundred patients of PD diagnosed as per UK Brain Bank criteria were assessed for severity and stage of PD using UPDRS and modified Hoehn &Yahr scales. The quality of sleep was assessed by Pittsburgh Sleep Quality Index and excessive daytime somnolence (EDS) was evaluated using Epworth Sleepiness Scale. Parkinson's Disease Questionnaire −39 (PDQ-39) was used to determine quality of life of the patients. Comorbid depression and anxiety were assessed using Inventory of Depressive Symptoms-Self Rated and Hamilton Anxiety Rating Scale. Pearson's correlation and multiple linear regressions were used to analyze relation of sleep quality with quality of life of patients.

Results: Fifty patients had poor sleep quality. EDS was present in only 9 patients. Co-morbid depression and anxiety were present in 52 and 34 patients respectively. While the motor severity assessed by UPDRS-III was observed to adversely affect quality of life, it did not negatively impact quality of sleep. Higher score on UPDRS-total and UPDRS IV suggesting advanced disease correlated with poor sleep quality. Depression and anxiety were significantly more frequent in patients with poor sleep quality ($p < 0.01$). Patients with poor sleep quality had worse quality of life ($r = 0.338$, $p < 0.05$). Depression and anxiety were also observed to have significant negative impact on quality of life of PD patients ($p < 0.01$). Poor sleep quality was not found to be an independent predictor of quality of life using multiple linear regression analysis.

Conclusion: Poor sleep quality along with comorbid depression, anxiety and advanced stage of disease is associated with poor quality of life.

1. Introduction

Parkinson's disease (PD) is a disease with evidence of neurodegeneration restricted not only to the dopaminergic neurons in substantia nigra, but also involves widespread affliction of several other neuronal networks including serotonergic, noradrenergic and cholinergic systems. In addition to bradykinesia, rigidity, tremor and postural instability, non-motor symptoms (NMSs) frequently lead to functional impairment and disability in PD patients. Quality of life (QoL) of patients with PD remains poor despite control of the motor symptoms with pharmacological and surgical modalities. Non-motor symptoms have been implicated for the poor QoL of these patients [1].

Sleep disruption is an important and frequently reported non-motor symptom in PD and it may remain undeclared unless specifically sought. It is hypothesized that sleep abnormalities in PD represent the underlying neuropathophysiology independent of that of the motor dysfunction. Concomitant abnormalities in non-dopaminergic neuronal networks involving serotonergic, noradrenergic or cholinergic transmission have been suggested as possible mechanisms of sleep disturbances in PD patients [2]. Evaluation of sleep disturbances in PD and instituting appropriate therapy would appear to be the logical step to improve well-being of patients with PD. Data on the subject of impact of sleep on quality of life in PD is as yet sparse [3,4]. In this study, we evaluated the quality of sleep in patients with PD and determined the impact of sleep quality on quality of life of the patients.

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2. Material and methods

2.1. Study design and patient selection

This was a cross-sectional analytical study conducted in the department of Neurology of our tertiary care teaching institute. The study was duly approved by the Institutional Review Board and Institutional Ethics Committee. The eligible patients for the study were recruited from Movement Disorder Clinic of the tertiary care center. One hundred patients of PD diagnosed as per UK Brain Bank criteria were included in the study [5]. Patients with age >70years, medical disorders known to affect sleep quality such as chronic kidney disease, chronic liver disease, chronic obstructive pulmonary disease, obstructive urological disorders, obstructive sleep apnoea and diabetic neuropathy were excluded. The exclusion of patients was based on history, physical examination and appropriate investigations according to the clinical findings. Patients with Mini-Mental Status Examination score (MMSE) <23 were also excluded from the study. Written informed consent was taken from all the patients prior to the recruitment.

2.2. Study methods and data collection

Demographic data was collected and recorded in a proforma. All the patients were evaluated by detailed clinical history taking and physical examination including neurological assessment. MMSE was administered to assess cognition of the patients. The severity and stage of PD were assessed by using Unified Parkinson Disease Rating Scale (UPDRS version 3.0), in 'on-state' [6]. UPDRS was supplemented by Modified H & Y scale for staging of the disease. All patients were requested to fill the self-rated questionnaires, the Pittsburgh Sleep Quality Index (PSQI) and Epworth Sleepiness Scale (ESS) for assessment of sleep, and Inventory of Depressive Symptoms-Self rated (IDS-SR) for assessment of depression. Patients were assessed for anxiety and quality of life using Hamilton Rating Scale for Anxiety (HAM-A) and Parkinson Disease Quality of Life Questionnaire 39 (PDQ-39) respectively.

Validated Hindi version of PSQI was used to assess the sleep quality of the patients [7]. PSQI is a self-administered scale and a total score of more than 5 indicates poor sleep. ESS contains 8 items concerning everyday situations. Score above 10 is considered as pathological sleepiness. IDS-SR-Hindi version was used for assessment of depression. It was self-rated by literate patients and questions were explained to patients who were illiterate providing them full privacy as per the guidelines for administration of the rating scale. HAM-A was used for assessment of anxiety [8]. A cut off score of 10 was used to define anxiety disorder. Quality of life of patients with PD was assessed using validated Hindi version of PDQ39. A single index score (PDQ-SI) was calculated out of the eight sub-scores of PDQ 39 as per the standard practice [9]. Score of 100 on PDQ-SI indicates the worst quality of life. Questionnaire was read out to the patients, who were illiterate or could not answer questionnaires on their own. The answers of the patients were recorded on the proforma. Caregivers were involved in filling up the questionnaires for complete assessment of sleep quality using PSQI and ESS as per the standard guidelines. Questions such as periodic limb movements during sleep, history suggestive of rapid eye movement behavioral disorder were asked from caregivers or room partners of all the patients. Details of medicines including anti-parkinsonian drugs of the patients were recorded and levodopa (LD) equivalent dose was calculated for dopaminergic drugs other than levo-dopa using the accepted conversion factor formula [10].

The patients were classified into two groups based on their quality of sleep as 'good sleepers' (PSQI ≤ 5) and 'poor sleepers' (PSQI > 5). The socio-demographic profile, UPDRS scores, H&Ystage, disease duration, treatment duration and drug treatment, were compared between the two groups. The relation of age, H & Y stage of disease, UPDRS score, duration of disease, treatment duration, depression and anxiety on sleep quality was determined. The impact of sleep quality on quality of life was evaluated using statistical methods for determining the relation of PSQI and PDQ-39.The contribution of duration of disease, treatment duration, stage and severity of disease, depression and anxiety on sleep quality and quality of life of PD patients was determined.

2.3. Statistical analysis

The Statistical Package for Social Science (SPSS) software "version 17" was used for statistical analysis. The mean and standard deviation were used for quantitative variables. Chi −square and student t −test were used for comparison of different categorical and discrete variables. To determine the correlation between PDQ39 and other variables, Pearson's correlation coefficients were calculated. Multiple Linear regression analysis was used to identify predictors of quality of life of PD patients.

3. Results

3.1. Demographic and disease severity characteristics

The mean age of the study population was 59.2 years (SD = 9.06). Seventy five out of one hundred patients were males. The mean disease duration of the patients was 44.87 months (SD = 44.06). Eighty four patients were on dopaminergic drugs and 16 patients were drug naïve. The mean LED of the study population was 367.53 mg per day (SD = 300.16). According to modified H &Y stage, 65, 29 and 6 patients were in stage 1-2 (mild PD), stage 2.5-3 (moderate PD) and stage 4-5 (severe PD) respectively.

3.2. Sleep quality and psychiatric comorbidities

Fifty percent of patients had poor sleep quality (PSQI > 5) and the other half had good sleep quality (PSQI ≤ 5). The mean PSQI score of all the hundred patients was 7.39 (SD = 4.98). The overall sleep quality, sleep onset latency, sleep duration and sleep efficiency were the more affected components of PSQI resulting in higher PSQI score in our patients. Forty of 84 (47.6%) patients on dopaminergic drugs and 10 of 16 (62.5%) drug naïve patients had PSQI score >5. There were 91 patients with ESS ≤ 10 and only 9 patients had ESS > 10 suggestive of excessive daytime somnolence. The mean ESS score in our patients was 5.26 (SD = 3.92). Five of the nine patients with ESS > 10 and 45 of the 91 patients with ESS < 10 were poor sleepers. None of our patients and their caregivers reported history suggestive of RLS, RBD and PLMS. Depression and anxiety were observed in 54 and 34 patients with median score of 16 (IQR 8–27) and 6.5(IQR 2–13) respectively.

3.3. Comparison of 'poor' (PSQI > 5) and 'good sleepers' (PSQI ≤ 5)

The two subgroups were observed to be comparable with respect to age, disease duration, treatment duration and levodopa equivalent dose (Table 1). Out of 50 patients with poor sleep quality, 17 patients were females and 33 males. The subgroup with good sleep quality included 42 males and 8 females. The number of females with 'poor sleep quality' was significantly more than those with 'good sleep quality'. While there was statistically no significant difference in H & Y stage of patients with poor and good sleep quality, 4 of the 6 patients with H & Y stage 4-5 had high PSQI score (PSQI Score >5). Patients with poor sleep quality had higher UPDRS-total and UPDRS IV scores than those with 'good sleep quality' ($p < 0.05$). While comparing the comorbid mood disorders it was observed that patients with poor sleep quality had higher mean IDS-SR and