Parkinsonism and Related Disorders 21 (2015) 461–464

Contents lists available at ScienceDirect

Parkinsonism and Related Disorders

journal homepage: www.elsevier.com/locate/parkreldis

Quality of sleep in young onset Parkinson's disease: Any difference from older onset Parkinson's disease

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ARTICLE INFO

Article history:
Received 19 December 2014
Received in revised form
8 February 2015
Accepted 10 February 2015

Keywords:
Parkinson's disease
Sleep
Young onset PD
Older onset PD

ABSTRACT

Background: Sleep disorders occur commonly in Parkinson's disease and are often under-recognized and under treated in clinical practice.
Objectives: To determine the quality of sleep in patients with Young onset Parkinson's disease (YOPD) and to note whether there is any difference in quality of sleep from those patients with older onset Parkinson's disease (OOPD).
Methods: One hundred and fifty six patients with Parkinson's disease (YOPD-51, OOPD-105) were clinically examined and quality of sleep was determined using Pittsburgh sleep quality index (PSQI), Parkinson's disease Sleep Scale (PDSS) and Epworth Sleep Scale (ESS). Other scales included Unified Parkinson's Disease Rating Scale -part III (UPDRS-III), Hoehn & Yahr Stage, Mini Mental Status Examination, Hamilton anxiety rating scale and Hamilton depression rating scale.
Results: The frequency of insomnia was higher in OOPD (55.2%) as compared to YOPD (27.5%) group ($p = 0.001$). The frequency of nightmares was lower in YOPD (7.8%) when compared to OOPD (24.8%) group ($p = 0.012$). The mean hours of actual sleep per night were higher in YOPD patients. Global PSQI score was better in YOPD indicating good overall sleep quality in YOPD patients. The total ESS score was significantly lower in YOPD ($p = 0.019$). The total PDSS score was significantly better in YOPD patients ($p = 0.018$).
Conclusions: Patients with YOPD had an overall better quality of sleep with lesser incidence of insomnia, nightmares, daytime sleepiness and restlessness during sleep.

1. Introduction

Parkinson's disease (PD) is the second most common neurodegenerative disorders after Alzheimer's disease which is being greatly recognized of late. It is characterized by resting tremor, bradykinesia, rigidity and postural instability and have asymmetric symptom onset [1]. Apart from the disabling motor symptoms, they also have non-motor symptoms such as depression, anxiety, hallucinations, autonomic dysfunction, sleep disorders ranging from insomnia to parasomnias, cognitive deficits [2]. Sleep disturbances were firstly reported in the original description by James Parkinson. Sleep disorders occur commonly in PD and are often under-recognized and under treated in clinical practice. About two third of PD patients have sleep disturbances throughout the disease [3]. They occur due to neurochemical and neurodegenerative changes in central sleep regulatory centres such as the forebrain, thalamus, and midbrain dopamine neurons [4]. Patients may have difficulty in falling asleep, fragmented sleep due to frequent and prolonged awakenings, early awakening, insufficient sleep during the night and excessive daytime sleepiness (EDS), snoring, nightmares and hallucinations. Young-onset Parkinson's disease (YOPD) refers to PD occurring at a younger age, having specific symptoms and genetic correlation. The diagnosis is made, when the age of onset of motor symptoms of PD is between 21 and 40 years [5]. They constitute about 3–6% of all cases of PD [6]. Symptoms in YOPD are similar to the classical symptoms of older-onset PD (OOPD), but some clinical features are more prominent in YOPD. “Wearing-off,” “on–off” dystonia, levodopa dyskinesia and dyskinesia in general are more prominent in YOPD [7]. YOPD patients tend to have many psychological symptoms such as psychosis, confusion, depression and hallucinations [8]. Literature on the quality of sleep and sleep disorders in YOPD are limited. To quote, no sleep disturbances were

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http://dx.doi.org/10.1016/j.parkreldis.2015.02.007
1353-8020/

observed in a family of patients with PARK6 mutation [9]. The aim of the study was to determine the quality of sleep in patients with YOPD and to note whether there was any difference in quality of sleep from those patients with OOPD. This study was questionnaire based and lack of polysomnographic confirmation was the key limitation of the study.

2. Methods

2.1. Patients

Patients presenting with features suggestive of parkinsonism (n = 156), who visited the neurology out-patient services, movement disorder clinic and those admitted in neurology ward of the National Institute of Mental Health and Neurosciences (NIMHANS) Bangalore, India were enrolled in the study. The enrolled patients satisfied the UK Parkinson Disease Society Brain Bank criteria or Queen Square Brain Bank criteria for PD [10,11]. Based on the age of onset of motor symptoms, they were grouped into young onset (age at onset of motor symptoms 21–40 years) & older onset PD. The study period was from October 2010 to December 2011 and was approved by the Institute Ethics Committee. All subjects gave written informed consent after full explanation and detail description of study method. The study was prospective, cross-sectional and hospital based.

2.2. Data collection

All patients were interviewed and examined with documentation of demographic variables, disease profile including age at onset of motor and non-motor symptoms, treatment profile. The staging of PD was done using modified Hoehn and Yahr staging (H&Y) [12] and cognitive function was assessed using the Mini-Mental Status Examination (MMSE) [13] scale. The total levodopa equivalent dose (TLED) was calculated in each patient [14].

Evaluation of sleep was carried out using the Parkinson's disease sleep scale (PDSS) [15], Pittsburgh Sleep Quality index (PSQI) [16] and Epworth Sleep Scale (ESS) [17]. PSQI is a self rated questionnaire utilized to assess the quality of sleep and sleep related disturbances during the preceding one month interval. This scale consists of 19 individual items that generate seven component scores. This score reflects the subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, usage of sleeping medication and the daytime dysfunction. Sum of the seven component scores yields a global score. Sensitivity of the global score more than five in distinguishing good sleepers from poor sleepers is 89.6% and specificity being 86.5%. Hamilton Anxiety Rating scale (HAM-A) [18] and Hamilton Depression Rating Scale (HAM-D) [19] were used to assess anxiety and depression respectively.

The severity of motor symptoms of PD was assessed using Unified Parkinson Disease Rating Scale III (UPDRS III) [20]. The following subscores of UPDRS III were also calculated in all patients: (i) tremor score (UPDRS 20-21, maximum score 28), (ii) rigidity score (UPDRS 22, maximum score 20), (iii) bradykinesia score (UPDRS 23-26, 31 maximum score 36), (iv) gait/postural stability score (UPDRS 27–30, maximum score 16), (v) bulbar abnormalities score (UPDRS 18–19, maximum score 08), (vi) axial signs score (UPDRS 18–19, 22, 27–30, maximum score 42) and (vii) limb signs score (UPDRS 20–26, maximum score 84).

The proportion of UPDRS III motor scores accounted for by each subscore was also calculated. For tremor score (% of UPDRS III), the tremor score was divided by the total UPDRS III score. Similar derivations were made to assess the proportion accounted by rigidity, bradykinesia, gait/postural stability, bulbar abnormalities [21]. The tremor dominant subtype of PD was defined as patients with a ratio of tremor to bradykinesia score (bradykinesia, rigidity and postural instability subscore from the UPDRS motor scale) of 0.5 or more, and the akinetic rigid subtype as patients with a ratio of <0.5 [22].

2.3. Statistical analysis

The data was entered into Microsoft excel and analyzed using SPSS version 16.0. The qualitative data was analyzed using chi square/Fischer's exact test. The continuous variables were expressed as mean ± standard deviation and categorical variables as frequency and percentage. The normality of the distribution was assessed by the skewness of the values. For the analysis of continuous variables, non-parametric test (Mann Whitney test and Wilcoxon test) was employed. A p value <0.05 was taken as statistically significant.

3. Results

One hundred and fifty six PD patients were recruited in the study, of which 51 patients were YOPD (mean age - 34.5 ± 6.4 years) and 105 patients were OOPD (mean age - 61.2 ± 8.0 years). A positive family history of PD was present in 12 patients (23.5%) in YOPD and 8 patients (7.6%) in OOPD which was statistically significant (p = 0.005).

3.1. Demographic features and clinical characteristics (Table 1)

The baseline demographic characteristics of PD were comparable in both the groups. The duration of disease was higher in YOPD patients which was statistically significant. YOPD patients were on longer duration of treatment with lower TLED, but were not of statistical significance. History of smoking and alcohol intake were similar. Side affected first with motor symptoms was left in majority of YOPD patients assuming statistical significance.

3.2. Motor scores and disease complications (Table 2)

The mean UPDRS III motor score was similar in both the groups. The subscores of UPDRS III were similar in both the groups with the exception of mean axial: limb signs ratio which was higher in OOPD patients (p = 0.04). Both the groups had similar mean H & Y staging. However, the frequency of patients with advanced stage of PD (H & Y ≥ 2.5) was lower in YOPD (37.3%) than OOPD (53.3%) group (p = 0.043). YOPD patients had a slightly higher MMSE score as compared to OOPD patients and was surprisingly statistically significant (p = 0.001). The frequency of patients with MMSE score <24 was lesser in YOPD (5.9%) as compared to OOPD (19%) group (p = 0.031). The frequency of patients with falls was higher in YOPD (17.6%) than in OOPD (7.6%) group (p = 0.05). Similarly, frequency of patients with motor fluctuations in the form of dyskinesia was higher in YOPD (43.1%) than in OOPD (18.1%) group (p = 0.001). The mean HAM-A and HAM-D scores were similar in both the groups.

3.3. Sleep scales (Table 3)

The frequency of patients with insomnia was lower in YOPD when compared to OOPD group. 14 patients (27.5%) with YOPD and 58 patients with OOPD (55.2%) had complaints of insomnia (p = 0.001). Similarly, the frequency of nightmares was lower in YOPD (7.8%) when compared to OOPD (24.8%) group (p = 0.012). The mean hours of actual sleep per night were higher in YOPD patients with statistical significance. Global PSQI score was better in YOPD group with statistical significance indicating good overall

Table 1
Clinical characteristics of YOPD (n = 51) and OOPD (n = 105) patients.

	YOPD (n = 51)	OOPD (n = 105)	P Value
Age (years)	34.5 ± 6.4	61.2 ± 8.0	0.001*
Age at onset (years)	31.6 ± 4.6	56.7 ± 8.1	0.001*
Gender male (%)	39 (76.5)	80 (76.2)	0.969
Duration of disease (years)	7.8 ± 5.6	4.6 ± 3.7	0.001*
Duration of treatment (months)	57.6 ± 55.3	37.9 ± 38.0	0.105
TLED (mg/day)	518.6 ± 271.4	643.6 ± 381.4	0.087
Familial PD (%)	12 (23.5)	8 (7.6)	0.005*
Site affected first			0.592
Upper limb (%)	40 (78.4)	86 (81.9)	
Lower limb (%)	7 (13.7)	9 (8.6)	
Both (%)	4 (7.8)	10 (9.5)	
Side affected first			0.02*
Right (%)	19 (37.3)	57 (54.3)	
Left (%)	32 (62.7)	43 (41)	
Both (%)	0 (0)	5 (4.8)	
Type of PD			
Tremor dominant (%)	23 (45.1)	50 (47.6)	0.864
Akinetic rigid (%)	28 (54.9)	55 (52.4)	
MMSE	28.6 ± 1.4	27.3 ± 2.4	0.001*
MMSE < 24 (%)	3 (5.9)	20 (19.0)	0.031*

Values expressed as Mean ± SD or number (%).
OOPD-Older onset PD, YOPD-Young onset PD, TLED-Total Levodopa Equivalent Dose, MMSE – mini mental state examination.
*P value significant <0.05.