Research Paper

Subjective poor sleep quality in Chinese patients with Parkinson´s disease without dementia

Li Zhang[a], Jingde Dong[a], Weiguo Liu[a], Yingdong Zhang[b,✉]

[a]*Department of Geriatric Neurology, Nanjing Brain Hospital Affiliated to Nanjing Medical University, Nanjing, Jiangsu 210029, China;*

[b]*Department of Neurology, Nanjing First Hospital Affiliated to Nanjing Medical University, Nanjing, Jiangsu 210006, China.*

Abstract

Parkinson´s disease (PD) is a common progressive neurological disorder and is composed of motor and non-motor symptoms. Sleep disturbances are frequent problems for patients with PD. The relationship between sleep disturbances with Hoehn and Yahr (H&Y) staging have been demonstrated. However, the relationship between sleep disorders and H&Y is still unclear in patients with PD without dementia in Chinese PD patients. In this study, we interviewed 487 non-demented PD patients of Chinese Han descents by H&Y classification. We found that night sleep quality was significantly associated with the severity of PD ($P = 0.008$). Panic disorder severity scale (PDSS) total scores were correlated with PD non-motor symptoms scale (PDNMS) scores ($r = -0.528$, $P < 0.001$), the Hamilton depression scale (HAMD) scores ($r = -0.545$, $P < 0.001$) and the Hamilton anxiety scale (HAMA) scores ($r = -0.498$, $P < 0.001$). Our results indicated that sleep quality deteriorated with the advancing of PD in Chinese non-demented patients with PD. Depression and anxiety may partly explain sleep disturbances in non-demented patients with PD.

Keywords: sleep quality, depression, anxiety, Parkinson disease, non-demented

INTRODUCTION

Parkinson´s disease (PD) is a common progressive neurological disorder involving 1.7% of the geriatric population in China[1] and 2.0% of the elderly popu–lation globally[2], respectively. There are no specific neuro-imaging modalities and reliable biomark–ers for the diagnosis of PD until now. PD is usually diagnosed clinically based on the UK Brain Bank criteria[3], which are composed of 4 aspects mainly referring to motor symptoms, including bradikinesia, rigidity, rest tremor and postural instability. Depres–sion, dementia, drug-induced psychosis, impulsivity and sleep disturbances may complicate the course and management of PD and lead to a variety of short- and long-term negative outcomes. Recent studies have fo–cused on non-motor symptoms besides motor signs.

Non-motor symptoms such as sleep disturbances and mood disorders are common in patients with PD. Sleep disturbances have been reported to occur in

90% of patients with PD[4,5]. In general, sleep disor–ders are broadly categorized into 2 types that include daytime manifestation and nocturnal sleep. The most common sleep problem is nocturnal sleep in the early stage of PD, including nocturia and nighttime cramps. Mood disorders have also been reported to occur in 50% of patients with PD[6]. Moreover, mood disorder could worsen sleep disturbance. The main manifesta–tions of mood disorders are depression and anxiety. The depressive mood could lead to poor sleep in mild and moderate PD. In addition, a correlation had been demonstrated in patients with PD from the USA[7] between sleep disturbances or mood disorders with Hoehn and Yahr (H&Y) staging, which classifies PD mainly by motor symptoms. However, the relationship between non-motor symptoms and motor symptoms was not clear in Chinese patients with PD without de–mentia. Chaudhuri et al.[8] developed a specific scale, the PD sleep scale (PDSS) and confirmed its valid–ity and reliability on sleep quality. In 2008, the PDSS was translated into Chinese and its validity and reli–ability on sleep quality were confirmed in Chinese PD population[9]. In this study, we sought to investigate changes in sleep in Chinese non-demented PD patients and further study the relationship between sleep qual–ity and PD.

SUBJECTS AND METHODS

PD patient selection

All consecutive patients with PD were recruit–ed from the neurology out-patient clinics at the authors´affiliated institutions from March 2010 to May 2012. All patients were diagnosed with idiopathic PD by movement disorders neurologists according to the UK Brain Bank criteria[3]. Patients with severe cogni–tive impairment or their Mini Mental State Exami–nation (MMSE) score < 24 were excluded. Patients with cerebrovascular disease, encephalitis, trauma and drug-induced Parkinson´s syndrome were excluded by referring to CT or MRI scan findings. Parkinson´s plus syndrome, conditions suffering from a serious physical illness, previous history and family history of

mental illness, and patients treated by antidepressant or anxiolytics were also excluded from this study. The study protocol was approved by the local institutional review boards at the authors´ affiliated institutions.

Instruments applied in the study for the as–sessment and rating

The neurologists made their evaluation by regular in-clinic follow-up visits and used the H&Y staging (**Table 1**)[10] to assess PD severity (mild: stage: 1-2; moderate: stage 2.5-3 and severe: stage 4-5), the PD non-motor symptoms scale (PDNMS)[11] to assess PD non-motor symptoms, the PD sleep scale (PDSS)[9] to assess sleep quality, the MMSE[12] to assess cognition, the Hamilton depression rating scale (HAMD)[13] and the Hamilton anxiety scale (HAMA)[14] to assess the mood of patients. These scales were widely used and have been validated in Chinese populations[9,11,15].

Statistical analysis

Descriptive statistical analyses were performed. Binary logistic regression models were constructed to examine the relationship between the PDSS and many factors. The one-way ANOVA test was used for continuous data. The chi-square test was used for unordered categorical variables and Kruskal Wallis test was used for ordinal categorical variables. The Pearson correlation coefficient was used for assessing the association between the PDSS and other scales, and between H&Y and other scales. $P \leqslant 0.05$ was considered significant. All logistic regression models were adjusted for gender and age. Statistical computa–tions were performed by using the statistical package for the social sciences (SPSS Version 13.0, SPSS Inc., Chicago, IL, USA).

RESULTS

We interviewed 487 PD patients without demen–tia. The demographic characteristics of the patients are shown in **Table 2** with H&Y classification. With H&Y classification, there were 317 (65.9%) patients with mild PD, 147 (29.3%) with moderate PD and 23 (4.8%) with severe PD. Age, sex, disease duration,

Table 1 **Modified H&Y stage of Parkinson´s disease**

Stage	Modified H&Y Scale
1	Unilateral involvement only
1.5	Unilateral and axial involvement
2	Bilateral involvement without impairment of balance
2.5	Mild bilateral disease with recovery on pull test
3	Mild to moderate bilateral disease; some postural instability; physically independent
4	Severe disability; still able to walk or stand unassisted
5	Wheelchair bound or bedridden unless aided

Table 2 Demographic characteristics of patients with Parkinson´s disease by H&Y category

Characteristics	Hoehn-Yahr staging			P
	Mild (stages 1-2)	Moderate (2.5-3)	Severe (4-5)	
N (%)	317(65.9%)	147(29.3%)	23(4.8%)	
Male/Female	193/124	89/53	10/14	3.861
Age (years)	70.77±58.09	68.99±9.65	69.50±11.00	0.931
Disease duration(days)	432.44±1177.43	400.03±667.20	758.08±1257.61	0.303
Education0/1/2/3/4/5	17/48/89/75/46/42	12/26/28/33/22/22	3/5/6/6/2/2	0.633
PDSS				
Sleep quality (1-3)	25.38±4.19	24.60±4.65	22.79±5.01	0.008
Nocturnal restlessness (4,5)	14.77±4.74	14.83±4.47	13.75±4.27	0.561
Nocturnal psychosis (6,7)	16.11±3.75	15.65±4.10	14.62±4.55	0.132
Nocturia (8)	7.25±2.68	7.16±2.58	5.96±2.90	0.073
Nocturnal motor-symptoms (9-13)	40.03±7.81	39.91±6.75	38.79±9.16	0.743
Daytime somnolence (14.15)	15.18±5.38	14.93±3.37	12.92±4.37	0.086
PDSS total score	118.72±21.0	117.08±19.36	108.83±24.62	0.072
PDNMS	12.77±9.35	13.16±9.92	14.79±9.77	0.587
MMSE	28.13±1.13	28.34±1.87	27.86±1.76	0.712
HAMD	10.41±7.43	10.83±8.08	11.46±7.43	0.732
HAMA	118.72±21.01	117.08±19.36	108.83±24.62	0.214

Education level: 0: Illiterate; 1: Primary school education; 2: Middle school education; 3: High school education; 4: College education; 5: Graduate education. PDSS: Parkinson´s Disease Sleep Scale; MMSE: Mini Mental State Examination; HAMD: Hamilton Depression Rating Scale; HAMA: Hamilton Anxiety Scale; PDNMS: Parkinson´s Disease Non-moter Symptoms Scale.

education status and MMSE scores were not signifi– cantly different among the three groups. The PDSS total score was 118.72 ± 21.0 for patients with mild PD, 117.08±19.36 for patients with moderate PD and 108.83±24.62 for patients with severe PD. There were no statistical differences among the three groups. Moreover, the scores of PDSS sub-items were not dif– ferent among the three groups except the sub-item of sleep quality. The score of sleep quality (item 1-3) was 25.38±4.19 for patients with mild PD, 24.6±4.65 for patients with moderate PD and 22.79±5.01 for pa– tients with severe PD ($P = 0.008$). The total scores of the HAMD scale were 10.41±7.43 for patients with mild PD, 10.83±8.08 for patients with moderate PD and 11.46±7.43 for patients with severe PD. The total scores of HAMA scale were 118.72±21.01 for pa– tients with mild PD, 117.08±19.36 for patients with moderate PD and 108.83±24.62 for patients with severe PD. Both scores were not different among the three groups.

The relationship between H&Y classification and the other variants are shown in **Table 3**. There were no significant correlations between H&Y classifica– tion and the scores of PDSS, HAMA and HAMD. The relationship between the PDSS and the other variants are shown in **Table 3**. On one hand, PDSS total scores correlated with PDNMS scores (r = -0.528, P < 0.001), HAMD scores (r = -0.545, P < 0.001) and HAMA scores (r = -0.498, P < 0.001). On the other hand, the

Table 3 Correlation of H&Y staging, PDSS and other variants

		r	P
H&Y	PDSS	-0.079	0.083
	PDNMS	0.032	0.480
	HAMD	0.025	0.577
	HAMA	0.086	0.060
	Age	0.057	0.214
	Duration	0.046	0.313
PDSS	PDNMS	-0.528	0.000
	HAMD	-0.545	0.000
	HAMA	-0.498	0.000
	Age	0.031	0.495
	Duration	0.043	0.349

PDSS: Panic disorder severity scale; PDNMS: Parkinson´s Disease Non-moter Symptoms Scale; HAMD: Hamilton Depression Rating Scale; HAMA: Hamilton Anxiety Scale.

PDSS was not correlated with age, disease duration and education status.

DISCUSSION

Sleep disturbances were firstly reported in the original description by James Parkinson[16]. Recently, sleep disturbances have been well-known phenomena in patients with PD, and the PDSS has been used as an easy and reliable instrument for measuring sleep disturbances in PD[8]. Our results showed a tendency

of the worsening of PDSS total scores with advanc–ing H&Y stage; however, it was not statistically significant. The results were a little different from previous studies. Tse et al. found that the mean total PDSS correlated with H&Y score[17] and Chaudhuri´s results showed similar association[8]. However, our PDSS total scores were as high as those of Chaud–huri´s study, which indicated impaired sleep of these non-demented patients with PD. The results showed that PD patients without dementia had nocturnal sleep and daytime somnolence problems of any stage. Dhawan et al. compared nocturnal disturbances among PD and healthy people by using the PDSS and confirmed that nocturia, nighttime cramps, dystonia and daytime somnolence were important factors for PD[18]. Earlier reports had attributed daytime sleepi–ness to nocturnal sleep fragmentation. For daytime sleepiness, we found that excessive daytime sleep was more common in patients with advanced PD compared with patients with early/moderate disease. The results are consistent with those reported data that daytime sleepiness is prevalent in almost 50% patients with PD[19]. Thus, sleep problem plagues non-demented patients with PD.

In this study, poor night sleep quality was signifi–cantly associated with severity of PD without demen–tia. The major problems were poor night sleep quality, difficulty in falling asleep and difficultly in staying asleep. Most sub-items of PDSS were not different at each PD stage, including nocturnal restlessness, noc–turnal psychosis, nocturia, nocturnal motor symptoms and daytime somnolence except the sub-item of sleep quality. H&Y stages are classified mainly depending on those motor signs. Recently, several methods have been well developed to improve the motor symptoms of PD, including drugs, deep brain stimulation, and re–habilitation training[20-22]. The greater the improvement of motor symptoms is, the greater the amount of drugs is. However, those drugs could also lead to side effect of sleep disorders[23]. Our results showed that the good control of nocturnal motor symptoms could partly ex–plain difference of our results from previous reports.

Depression and anxiety are the most common non-motor aspects of PD, with a reported prevalence of approximately 50% and 40%, respectively. Both de–pression and anxiety appear to be more predictive of distress than motor disability in PD[24]. Depression and anxiety contribute to disability and impaired life quality in PD. But our results found that the relation–ship between depression and anxiety with the sever–ity of PD was not significantly close. In our study, depression and anxiety were significantly associated with sleep disturbance in non-demented PD patients.

This result is similar to the result of Borek´s report[7]. The previous studies found that mood disorders were important risk factors for poor sleep quality in PD[25]. Borek et al.[7] found that severe depression or anxiety worsened poor sleep quality. In contrast with Menza´s report[25], their results did not agree with our results. They confirmed that depression and anxiety did not contribute significantly to all variances in sleep qual–ity. The reason may be that these researchers used different scales to assess mood.

Patient age and duration of PD were important risk factors for sleep quality. Sleep quality deteriorated along with growing age or the protracted course of disease. Our results showed that the above two factors were not associated with sleep quality in these non-demented PD.

In summary, our study found that sleep quality de–teriorated with the advancing of PD in Chinese non-demented patients with PD. Depression and anxiety may partly explain sleep disturbance in these non-de–mented patients with PD. These results could contrib–ute to increasing the recognition of sleep disturbances and lead to better treatment of depression and anxiety in those non-demented patients with PD.

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