Evaluation of Sleep Disorders in Parkinson's Disease: A Comparison between Physician Diagnosis and Self-Administered Questionnaires

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Objective: *The objective of the present study was to compare a physician's diagnosis of sleep disorders in patients with Parkinson's disease (PD) during clinical evaluation of sleep disorders diagnosed by validated questionnaires.*
Material and Method: *Patients with PD at the Parkinson's clinic at Siriraj Hospital were included in this prospective cross-sectional study. Patients completed the Modified Parkinson's Disease Sleep Scale (MPDSS), Thai Epworth Sleepiness Scale (Thai-ESS), Scales for Outcomes in Parkinson's Disease-Sleep Scalequestionnaire (SCOPA), Berlin questionnaire (Thai version), and Siriraj sleep questionnaire (SSQ). Thereafter, attending physicians diagnosed sleep disorders based on patient evaluation.*
Results: *One hundred twenty patients with PD participated in the present study. Among them, 73 (60.8%) were males, the mean age was 61.5±12.0 years, and the mean body mass index (BMI) was 22.7±3.5 kg/m^2 (BMI ≥30 kg/m^2 in 1.7% of patients). The study demonstrated a prevalence of overall sleep disorders in 59.2% of patients based on physician diagnosis and 81.7% of patients based on the MPDSS questionnaire. The ESS was >10 in 29.2% of the patients. High risk for obstructive sleep apnea was observed in 28.3% (Berlin) and 42% (MPDSS) of patients (15% by both). SSQ detected all sleep disorders in 86.7% of the population, and its results correlated with the MPDSS.*
Conclusion: *Sleep disorders are common in patients with PD but remain underestimated because they are not routinely screened in clinical practice. This study demonstrates the use of validated questionnaires to efficiently detect and classify patients with PD at risk for common sleep disorders.*

Keywords: *Sleep disorder, Sleep questionnaire, Parkinson's disease*

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Sleep disturbances are prevalent in patients with Parkinson's disease (PD), affecting up to 88% of them[1]. Sleep disturbances in these patients are often severe, typically are not recognized, and thus are ineffectively treated[2]. Multiple factors can contribute to disturbed nocturnal sleep and daytime sleepiness, including insomnia, mood or anxiety disorders, dementia, specific sleep disorders, PD motor disorders, and the effects of certain medications. Because of the underestimation of the severity of sleepiness or perhaps the lack of awareness, patients should preferably be interviewed in presence of a relative or caregiver. Nocturnal sleep disturbance occurs in 60-98% of patients[2]. Community studies have reported that approximately 60% of patients with PD have sleep disorders as compared to that in 33% of control subjects[3]. Common sleep problems include insomnia symptoms (difficulty initiating and maintaining sleep), sleep-related breathing disorders (SDB), persistent motor symptoms, excessive daytime somnolence, and rapid eye movement (REM) sleep behavior disorder (RBD)[4].

Insomnia is the inability to maintain a single episode of unbroken sleep. Psychiatric disorders, such as depression or general anxiety disorder, are common causes. Insomnia occurs in approximately 30% of patients with PD[5]. Insomnia is generally divided into

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three types: difficulty falling asleep (sleep initiation), difficulty staying asleep (sleep maintenance), and awakening too early in the morning. Although all three problems occur in these patients, sleep maintenance difficulties are the most common, affecting up to 74-88% of them[6,7].

Sleep-related breathing disorders (SDB) may occur because of central sleep apnea or obstructive sleep apnea (OSA). As breathing becomes more difficult or ceases, blood oxygen levels fall, which leads to insufficient awakening to restore breathing. Consequently, the patient experiences little deep restorative sleep at night and extreme daytime sleepiness. Apnea has been reported in as many as 50% of patients with PD[7]. Snoring and apneic episodes also may be up to three times more common in patients with PD (12%) than in the general population[7]. Prevalence of sleep-related breathing disorders increase as people age[8]. The most common disorder is OSA, which is known to increase mortality in the elderly[8]. However, the elderly are less likely to complain of respiratory disturbance during sleep despite having symptoms of snoring, gasping, choking, and shortness of breath. An elderly spouse may also overlook episodes of breathing cessation.

Persistent motor symptoms during sleep include restless leg syndrome (RLS) and periodic leg movements (PLMs). RLS generally occur at the beginning of sleep and presents as a disagreeable restless feeling that is often relieved by only moving the legs. RLS is a subjective complaint, and the criteria for diagnosis include the desire to move limbs with or without paresthesias or dysesthesia, symptom exacerbation during the evening or night, and symptom worsening at rest, with some relief with activity[9]. Prevalence of the disorder increases with age and affects up to 15% of elderly patients. The majority of patients with RLS experience PLMs occurring at 20-40s intervals and last for 0.5-5s[10]. Periodic limb movement disorder (PLMD) is rhythmic moving or jerking of the limbs during sleep. Both of these disorders may interfere with the quantity and quality of sleep. RLS and PLMs are common in Patients with PD, occurring in up to 15% of them and can lead to disrupted sleep and excessive daytime sleepiness (EDS)[11]. PLMs may affect one or both lower limbs and may affect the arms and torso. The movements can cause arousals and awakenings[12].

It is estimated that 15-51% of patients with PD complain of EDS[13-16]. In some studies, EDS is more common in patients with PD than in healthy controls. EDS can cause cognitive impairment that can range from mild to severe, with deficits in attention, memory, and judgment. Factors contributing to daytime sleepiness include insomnia, mood and anxiety disorders, dementia, motor disorders associated with PD, the effects of PD and other medications, specific sleep disorders, and concurrent medical illness.

RBD is a syndrome with symptoms of abnormal behavior during REM sleep. Under normal circumstances, voluntary muscles are atonic when one enters REM sleep. However, the absence of this normal atonia in patients with RBD causes the acting out of dreams. RBD, of varying degrees of severity, occurs in 15-50% of patients with PD, and higher rates are observed when patients are studied by polysomnography (PSG)[17]. RBD is possibly the result of degenerative changes in the brain and many patients with RBD eventually develop PD or dementia[18]. It is, therefore, thought that RBD often reflects an underlying common pathology (synucleinopathies) across neurological illness[17]. RBD is characterized by vigorous and injurious behavior during REM sleep that usually represents attempted enactment of vivid action-filled violent dreams[19-21]. A diagnosis of RBD requires polysomnographic monitoring, which indicates loss of generalized muscle atonia during REM sleep or prominent phasic muscle twitching in REM[22]. The overall sleep architecture is normal and the REM/non-REM cycle is intact. RBD pathophysiology involves functional depression or destruction of brainstem serotonergic or noradrenergic regions responsible for the atonia of REM sleep[23,24]. The prevalence of RBD is unknown but is more common in older men[21,22]. The occurrence of REM sleep without atonia and RBD in PD has been reported in up to 47% of patients[25], with RBD correlating with PD duration, severity, and the use of dopaminergic drugs[26,27].

Many studies have demonstrated the impact of PD on quality of life, and sleep difficulties are independent and important predictors of poor quality of life[28]. Thus, evaluation of sleep problems in patients with PD involves a systematic review of the differential diagnoses and sometimes the use of polysomnography. However, because polysomnography cannot be performed on all patients, the use of appropriate questionnaire(s) is an alternative way to detect sleep problems. The validated questionnaires examining sleep problems that are used regularly in PD are the Parkinson's Disease Sleep Scale (PDSS)[29], the Scales for Outcomes in Parkinson's Disease-Sleep Scale (SCOPA-Sleep scale)[30], the Epworth Sleepiness Scale (ESS)[31], and the Berlin questionnaire (BQ)[32]. The

PDSS is recommended for assessing overall sleep problems and measuring their severity, the SCOPA is recommended for assessing overall sleep problems, particularly for screening for insomnia and excessive daytime sleepiness, the ESS is recommended for screening and measuring the severity of daytime sleepiness, and the BQ is recommended for assessing snoring and sleep breathing disorders[33]. There is also evidence that patient's self-reported questionnaires could significantly reveal sleep problems[34]. The Siriraj sleep questionnaire (SSQ) is a patient self-reported questionnaire used to identify sleep problems, such as insomnia, excessive daytime sleepiness, snoring, restless leg syndrome, periodic limb movement, and REM behavior disorder, but it could be applied to patients with PD as well.

The aim of the present study was to compare physician-obtained diagnoses of sleep disorders in patients with PD based on patient evaluation with the prevalence of likely sleep disorders in these same patients based on the questionnaires (Thai-ESS, Modified Parkinson's Disease Sleep Scale [MPDSS], SCOPA, BQ, and the SSQ). The authors hypothesized that the physicians do not routinely evaluate sleep disorders in patients with PD; moreover, validated questionnaires, including the SSQ, could efficiently identify individuals who need further sleep evaluation.

Material and Method

Subjects

A prospective survey study was performed at Siriraj Hospital (Mahidol University), an academic tertiary medical center. The present study was conducted from May 2011 to November 2012 after the approval from the Siriraj Institutional Review Board. Consecutive patients who were diagnosed with idiopathic PD according to the UK Parkinson's Disease Society Brain Bank Clinical Diagnostic Criteria were recruited from the Parkinson clinic at Siriraj Hospital. Subjects were excluded if they had a history of taking sedative drugs, alcohol, or opioid derivatives. Patients with other comorbidities such as intracranial tumors or psychiatric problems were also excluded. Patients were approached during the checkout process (after completing their visit with the physician). The present study was explained in detail, and informed consent was obtained. All eligible subjects were asked to complete a set of questionnaires comprised of the modified PDSS, Thai-ESS, Thai-SCOPA, BQ, and SSQ.

Demographic data were recorded at the visit, including gender, age, body weight, height, severity and duration of disease, co-morbidities, and current medications. Patients were routinely managed for PD by attending physicians (internal medicine residents, neurology residents, or neurology consultants). In addition, sleep problems were evaluated in all patients from noted history only. Sleep problems were classified in one or more of these categories: insomnia, sleep-disordered breathing, RLS, RBD, and excessive daytime sleepiness. All physicians were masked to their patients' participation in the study. Although physicians were aware of a sleep survey study being performed at the institution, they were unaware of which patients might be participating because this was a convenience sample taken after the patient's encounter with the physician.

Questionnaires

MPDSS is a visual analog scale questionnaire that is scaled from 0 to 10 by patients and caregivers. A score of 10 indicates the patient has never experienced the symptom. If the patient has experienced a symptom, it is scaled depending on the frequency of that symptom (i.e. lower scores reflect more a frequent symptom and low quality of sleep)[36]. The authors used scores lower than 6.0 as a presumptive diagnosis of sleep disorders, as suggested by Chaudhuri and Martinez-Martin[35].

The ThaiSCOPA Sleep questionnaire consists of two sections: the nighttime sleepiness (NS) and daytime sleepiness (DS) subscales. The SCOPA-NS consists of five items used to assess sleep initiation, sleep fragmentation, sleep efficiency, sleep duration, and early awakening. Subjects must indicate how much they were bothered by particular sleep problems, ranging from 0 (not at all bothered) to 3 (very bothered). The maximum score of this scale is 15, with higher scores reflecting more severe sleep problems. One additional question evaluates overall sleep quality on a 7-point scale (ranging from slept very wellto slept poorly). The score on this item is not included in the score of the NS scale but is used separately as a global measure of sleep quality. The DS subscale evaluates DS in the past month and includes 6 items with 4 response options, ranging from 0 (never) to 3 (often). The maximum score is 18, with higher scores reflecting more severe sleepiness[36]. Presence cut-off 5/6 suggested distinguishing good from bad sleepers.

The Thai-ESS is a set of self-administered questionnaires that aims to assess the degree of sleepiness during eight common situations where subjects are asked to rate their chance of dozing based on a scale of 0 to 3 in each situation[33]. The total score, thus, ranges from 0 to 24, and a lower score indicates

less sleepiness. A score >10 is generally considered suggestive of significant sleepiness.

The BQ is self-administered, consisting of 10 symptom-items in three categories related to the risk of having SDB[32]. Scoring stratifies subjects into high- and low-risk groups: a subject at high risk for SDB must have positive scores in two or more categories. Subjects who deny frequent symptoms and do not report symptoms or score positive in only one category are placed in the low-risk group. The BQ is used widely in research as a screen for SDB. High SDB risk based on the BQ predicts PSG-proven SDB with a sensitivity of 86% and a specificity of 77%[34].

The SSQ is a patient's self-reported questionnaire that is used in patients with sleep complaints. Questions in the SSQ probe for symptoms of insomnia (5 questions), leg cramp or jerks during sleep (2 questions), strange sensations in the leg while awake (2 questions), breathing disorders while asleep (5 questions), abnormal movements during sleep (3 questions), and daytime somnolence (12 questions). The scoring for these questions with regard to high probability for a disorder is based upon the persistent presence of these problems based on the patient's response of "yes" or "no" or ">3 times a week" to the majority of symptoms.

Statistical analyses

Continuous variables are reported as the mean and standard deviation. The categorical variables of sleep symptoms and suspected sleep disorders are reported as percentages of the total population. McNemar's test and κ coefficient were used to determine the degree of agreement between tests. κ >0.8 was considered excellent agreement beyond chance; κ between 0.6 and 0.8, substantial to moderate agreement; κ between 0.2 and 0.4, fair agreement; and κ <0.2 represented poor agreement. All statistical analyses were performed using SPSS18 for WINDOWS.

Results

Demographic and other health characteristics

One hundred twenty patients agreed to participate in this study. The clinical and demographic characteristics of the study population are shown in Table 1. There was a male preponderance in the subjects evaluated. Two (1.7%) subjects were obese (BMI $\geq$30 kg/m^2). Most patients (n = 49, 40.8%) were idiopathic PD; the Hoehn and Yahr classification was 2.0$\pm$0.9 and the mean duration of disease was 6.4 years.

Table 1. Demographic and health characteristics of patients (n = 120)

Gender (% male)	73 (60.8% male)
Age (years)	61.5$\pm$12.0
BMI (kg/m^2)	22.7$\pm$13.5
PD severity (stage)	
1	34 (28.3%)
2	49 (40.8%)
3	28 (23.3%)
4	7 (5.8%)
Duration of disease (years)	6.4$\pm$4.4
Comorbidities (%)	49 (40.8%)
No artherosclerotic risks	63.3%
Documented artherosclerotic risks	36.7%
Documented cardiovascular disease	9.2%
Documented cerebrovascular disease	2.5%
Medications	
Levodopa use	95.8%
Dopamine agonist use	65.8%
1 medication use	34.2%
At least 2 medications use	65.8%

Prevalence of sleep disorders: physician diagnosis vs. questionnaires

Our results demonstrate a high prevalence of sleep disorders in patients with PD. At least one sleep-related symptom was documented by physicians in 59.2% of these patients. However, using the validated questionnaires, MPDSS detected 98 (81.7%) patients and the SSQ detected 104 (86.7%) patients with a sleep disorder (Fig. 1). Compared to the physicians, the questionnaires identified patients as being at risk or having symptoms suggestive of sleep disorders at a greater frequency; more than 20% of patients were not detected if the validated questionnaires were not used. Questions pertaining to insomnia revealed the most commonly documented sleep disorders. Among these patients, positive insomnia symptoms were observed in 49 (40.8%) patients and were diagnosed by physicians (Fig. 2). However, 67 (55.8%) patients reported some insomnia symptoms in the MPDSS questionnaire.

Twenty (16.7%) patients were screened for sleep breathing disorders based on physician encounters, whereas 51 (42.5%) patients reported snoring in the MPDSS. RLS was diagnosed in 8 (6.7%) patients by physicians in contrast to the diagnosis of 50 (41.7%) patients using the MPDSS. Excessive daytime sleepiness was documented in 11 (9.2%) patients by physicians, whereas the MPDSS identified 49 (42.5%) patients with excessive daytime sleepiness,

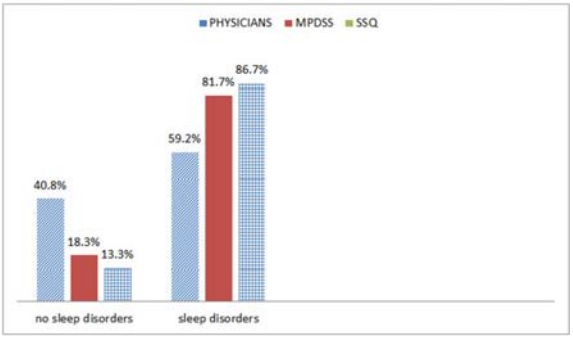
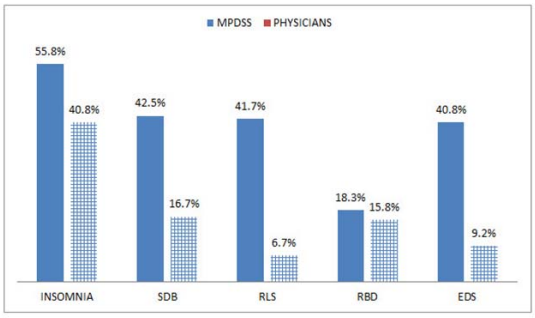


Fig. 1 Prevalence of Sleep disorders: Physicians vs. Questionnaires (MPDSS, SSQ).



Comparison of sleep disorders between MPDSS questionnaires and diagnoses by physicians

MPDSS and Physicians	McNemar's chi-squared test	K coefficient
Insomnia	0.022	0.086
Sleep breathing disorders	<0.001	0.241
Restless leg syndrome	<0.001	0.026
Excessive daytime sleepiness	<0.001	0.098
REM behavior disorder	0.701	0.207

Fig. 2 Prevalence of sleep disorders as determined by the MPDSS vs. physicians.

which correlated with 35 (29.2%) patients that reported ESS >10 (suggesting pathological sleepiness). No patient encountered documented symptoms of, or being screened for cataplexy.

Prevalence of excessive daytime sleepiness as determined using ESS questionnaires vs. physician diagnoses

The results demonstrated that 35 (29.2%) patients were diagnosed with excessive daytime sleepiness using ESS questionnaires (reported ESS >10, suggesting pathological sleepiness), whereas 20 (9.2%) patients were diagnosed by doctors (Fig. 3). These data correlate with the results from comparisons between MPDSS questionnaires and doctors. The mean scores of ESS were 7.4±5.0, range 0-22.

Prevalence of restless leg syndrome as determined using the RLS-screening questionnaire vs. physician diagnoses

The present study demonstrated more prevalent diagnoses of RLS by questionnaire, which incorporates the International Restless Legs Syndrome Study Group IRLSSG diagnostic criteria for RLS, than by the doctors [46 patients (38.3%) vs. 8 patients (6.7%), respectively]. It also correlates with the MPDSS, which detected 50 (41.7%) patients.

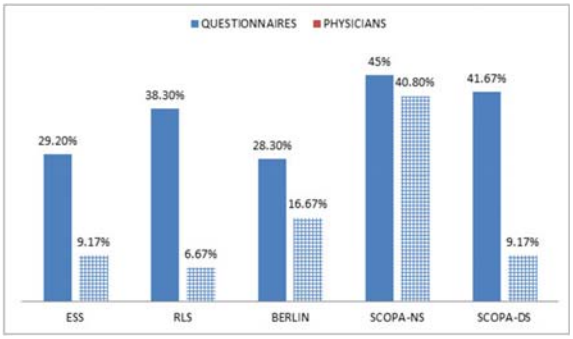
Suspected sleep breathing disorder as determined using the BQ

The results demonstrate that 20 (16.7%) patients were diagnosed with sleep breathing disorders by doctors. However, the BQ suggested that 34 (28.3%) patients were high-risk for OSA, whereas the MPDSS questionnaire found that 51 (42.5%) patients were high-risk. Eighteen patients (15%) were categorized as high-risk for OSA by both the Berlin and MPDSS questionnaires. Further analyses of specific questionnaire answers in the OSA high-risk subjects were also performed. For those scored as high-risk for OSA on the BQ, 60% scored positive in category 1 (snoring and witnessed apneas), 34% scored positive in category 2 (tiredness and sleepiness), and 0% scored positive in category 3 (elevated BMI) (Fig. 3).

Prevalence of insomnia and excessive daytime sleepiness as determined by the SCOPA

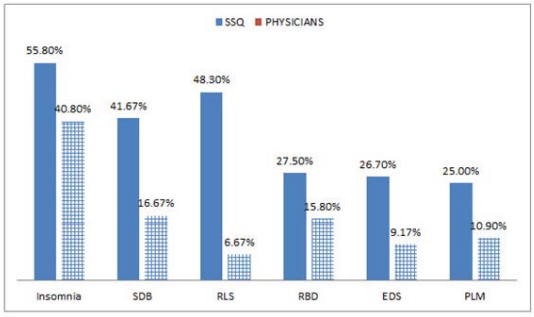
The present study demonstrated SCOPA had significant differences in excessive daytime sleepiness detection when compared with diagnoses from doctors. The SCOPA-NS detected insomnia in 54 (45%) patients compared with 49 (40.8%) patients from physicians. In addition, the SCOPA DS reported 50 (41.6%) patients with excessive daytime sleepiness in contrast to 11 (9.2%) patients from doctors (Fig. 3).

The authors also observed that the SSQ could significantly detect patients with sleep disorders better than obtaining a physician's diagnosis in all categories. The most common sleep disorder was insomnia, which was detected in 67 (55.8%) patients as compared with 49 (40.8%) patients diagnosed by physicians (Fig. 4). For sleep breathing disorders, SSQ detected 49 (41.7%) patients. SSQ reported RLS in 58 (48.3%) patients,



Comparison between the validated questionnaires and physician diagnosesbased on McNemar's chi-squared test. Significant p-value <0.05 in all items

Fig. 3 Prevalence of sleep disorders as determined by the validated questionnaires vs. physicians.



Comparison between the SSQ and obtaining a diagnosis from a physician

SSQ & Doctors	McNemar's chi-squared test	K coefficient
Insomnia	0.011	0.249
Sleep breathing disorders	<0.001	0.063
Restless leg syndrome	<0.001	0.073
REM behavior disorder	0.038	0.037
Excessive daytime sleepiness	0.001	0.057
Periodic leg movement	0.009	-0.068

Fig. 4 Prevalence of sleep disorders as determined by the SSQ vs. physicians.

whereas physicians diagnosed it in 40% of patients. For abnormal REM behavior, SSQ significantly detected more patients than physicians did, as well as significantly more than the MPDSS (33 patients, 27.5% vs. 19 patients, 18.3%, respectively) did. SSQ detected excessive DS approximately two fold more often than physicians (32 patients (26.7%) vs. 11 patients (9.2%), respectively). For PLM, the MPDSS included no items that could identify PLM; however, the SSQ detected PLM significantly more than what physicians (30 patients (25%) vs. 13 patients (10.9%), respectively) did (Fig. 5).

Discussion

The current prospective cross-sectional study confirms previous data that found physicians do not routinely screen patients with PD for sleep disorders. In the present study, there were more males enrolled and the mean age of recruited patients was 61.5 years, with an age range from 39 to 95 years. Our results showed a high prevalence of sleep disorders in patients with PD (60-90%), with a prevalence of 59.20% from a physician diagnosis and 81.70% from the MPDSS. This correlated with a previous study that reported self-assessment of sleep disorders in patients with PD revealed problems in only 58% of subjects, whereas the MPDSS noted sleep problems in 76% of patients with PD[35], thereby confirming that sleep disorders in PD are possibly underdiagnosed. This is supported by our observation of low concordance between clinical assessments for sleep disorders and questionnaire risk stratification for common sleep disorders. Polysomnography is the test of choice for diagnosing sleep disorders. However, it must be performed by sleep specialists, and in many situations, particularly in developing countries, it is not available for patients suspected of sleep disorders. The use of sleep questionnaires is very useful for screening and helpful for diagnoses. The standard validated sleep questionnaires that are used in patients with PD are the MPDSS, SCOPA, BQ, ESS, and RLS-screening questionnaire. In the present study, we used multiple validated questionnaires to screen and classify sleep disorders, and observed that the modified PDSS could detect and screen common sleep disorders including insomnia, sleep breathing disorder, RLS, abnormal REM behavior, and excessive DS. Our results indicated that the MPDSS detected sleep disorders more than diagnoses by a physician in all categories. It detected insomnia symptoms in 55.8% of patients compared to 40.8% who were diagnosed by physicians ($p<0.05$). No patient encounters with physicians documented symptoms of or screened for cataplexy. The results were statistically significant ($p<0.05$) in all categories except abnormal REM behavior, which was detected in 22 (18.3%) patients from the MPDSS questionnaire, but in 19 (15.8%) patients from a physician. The validated questionnaire detected more disorders than the doctor

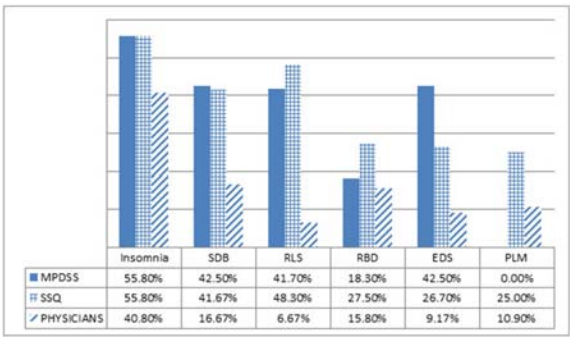


Fig. 5 Prevalence of overall sleep disorders as determined by the SSQ, MPDSS, and physicians.

did; however, it was statistically insignificant.

The ESS is useful for diagnosing excessive daytime sleepiness and has high validity and reliability as compared with polysomnography. Excessive DS in this study was demonstrated in 35 (29.2%) patients by ESS, and 9.2% of patients were diagnosed by doctors. The mean scores of ESS were 7.4±5.0, with a range of 0-22. The data significantly correlated with the prevalence observed in the MPDSS. We observed 18.3% of patients were diagnosed with excessive daytime sleepiness from both the ESS and MPDSS. Therefore, they are considered high-risk and should be referred for polysomnography.

For sleep breathing disorders, the BQ is the standard questionnaire to aid diagnosis and is the tool used to screen patients before performing polysomnography. This study found that the BQ could significantly detect sleep breathing disorders more accurately than a diagnosis from a physician, and the results correlated with the MPDSS. The results demonstrated that 20 (16.7%) patients were diagnosed with sleep breathing disorders by physicians, whereas the BQ suggested that 34 (28.3%) patients were at risk of OSA and the MPDSS questionnaire indicated 51 (42.5%) patients at risk. Eighteen patients (15%) were categorized as high-risk for OSA by both the Berlin and MPDSS questionnaires.

The Thai-SCOPA sleep questionnaire consists of two sections: the NS and the DS subscales. The cut-off point of NS scores are 6/7 in SCOPA-NS and 4/5 in SCOPA-DS[38]. In the present study, SCOPA-NS detected insomnia in 54 (45%) patients as compared with 49 (40.8%) patients detected by a doctor. SCOPA-DS reported 50 (41.6%) patients with excessive DS in contrast to 11 (9.2%) patients from a physician's diagnosis. Our study population was NS in 45% and EDS in 41.6%, which is comparable with a previous study with an accounted NS of 39.2% and EDS of 47.1%[36].

The present study found the prevalence of restless leg syndrome (RLS) diagnosis by questionnaires that incorporate the IRLSSG diagnostic criteria was 30.3%, more than a physician's diagnosis (6.7%). The results correlated with the MPDSS that diagnosed RLS in 41.7% of the population. According to previous studies, RLS prevalence varies greatly ranging from 5 to 15% in adult white populations[37-39]. However, some studies reporting a higher prevalence of RLS in patients with PD[40,41]. On do et al reported RLS in 20.8% of his series of 303 patients with PD[40]. It is possible that patients with milder RLS were not identified in the initial clinical screening if they did not complain about RLS symptoms, thus leading to an underestimation.

The SSQ is a Thai sleep questionnaire used for patients with PD. In this study, it detected all sleep disorders in 86.7% of patients. In addition, it correlated with the MPDSS and detected all categories of sleep disorders, particularly abnormal REM behavior and PLM.

On the basis of our results, sleep disorders were detected more consistently by validated questionnaires than by diagnoses by physicians while the patients visited the PD clinic. Therefore, if we applied the self-validated sleep questionnaires to screen patients with PD, we could detect patients with sleep disorders earlier; therefore, they could be transferred to a sleep specialist for polysomnography and further management.

Although the present study was performed in an academic center with both a neurological medicine training program and an internal medicine training program, the results prove that diagnoses remained underestimated. One potential reason for the infrequent screening of common sleep disorders is the lack of awareness among physicians regarding the importance of recognizing and treating sleep disorders. Additional reasons may be related to the limited time allocated for evaluation in the outpatient clinical setting, lack of reimbursement, and high demand for services with pressure to address the patients' more pressing concerns.

A useful strategy is to implement standardized protocols that utilize patient-completed screening questionnaires before physician evaluation. This reduces time spent by the physician in gathering data and maintains the decision-making capacity of a physician. This approach has proven effective in improving patient care in other clinical settings. The

questionnaires used in the present study have accurately identified patients with PD at risk for the common sleep disorders encountered in tertiary care.

In summary, sleep disorders are common but are not routinely screened for in patients with PD. The use of validated questionnaires may efficiently identify those patients who are at risk for common sleep disorders; however, further studies are required.

Conclusion

The present study demonstrates that validated questionnaires can significantly detect and classify sleep disorders in patients with PD, more than obtaining a physician's diagnosis. This is the concurrent validity test of the SSQ for Thai patients with PD, and the SSQ results correlated with the MPDSS results. Therefore, the standard validated sleep questionnaire and SSQ are useful for screening for sleep disorders in Thai patients with PD.

Clinical impact

The validated sleep questionnaire could be a practical method to assess sleep disorders in patients with PD. These may detect and categorize patients better than a physician diagnosis and pave the way for selecting patients earlier for polysomnography and suitable treatments.

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Potential conflicts of interest

None.

References

1. Charles H, Michael J. Sleep issues in Parkinson's disease. Neurology 2005; 64:12: 3S12-20.
2. Tandberg E, Larsen JP, Karlsen K. A community-based study of sleep disorders in patients with Parkinson's disease. Mov Disord 1998;13:895–9.
3. Wetter TC, Collado-Seidel V, Pollmacher T, Yassouridis A, Trenkwalder C. Sleep and periodic leg movement patterns in drug-free patients with Parkinson's disease and multiple system atrophy. Sleep 2000;23:361–7.
4. Smith MC, Ellgring H, Oertel WH. Sleep disturbances in Parkinson's disease patients and spouses. J Am Geriatr Soc 1997; 45:194–9.
5. Kumar S, Bhatia M, Behari M. Sleep disorders in Parkinson's disease. Mov Disord 2002;17:775–81.
6. Karlsen KH, Tanberg E, Arsland D, Larsen JP. Health related quality of life in Parkinson's disease: a prospective longitudinal study. J Neurol Neurosurg Psychiatry 2000 ;69:584–9.
7. Boeve BF, Silber MH, Parisi JE, Dickson DW, Ferman TJ, Benarroch EE, et al. Synucleinopathy pathology and REM sleep behavior disorder plus dementia or parkinsonism.Neurology 2003;61:40–5.
8. Ancoli-Israel S, Kripke DF, Klauber MR, Fell R, Stepnowsky C, Estline E, et al. Morbidity, mortality and sleep- disordered breathing in community dwelling elderly. Sleep 1996;19:277–82.
9. Allen RP, Picchietti D, Hening WA, Trenkwalder C, Walters AS, Montplaisi J. Restless legs syndrome: diagnostic criteria, special considerations, and epidemiology. Sleep Med 2003;4:101–19.
10. Trenkwalder C, Walters AS, Hening W. Periodic limb movements and restless legs syndrome. Neurol Clin 1996;14:629–50.
11. Greulich W, Shafer D, Georg WM, Schlafke ME. Sleep behaviour in patients with PD. Somnology 1998;2:163–71.
12. Happe S, Schrodl B, Faltl M, Muller C, Auff E, Zeitlhofer J. Sleep disorders and depression in patients with Parkinson's disease: results of a study with the Sleep Disorders Questionnaire (SDQ) and the Zung Depression Scale (ZDS). Acta Neurol Scand 2001;104:275–80.
13. Tandberg E, Larsen JP, Karlsen K. Excessive daytime sleepiness and sleep benefit in Parkinson's disease: a community-based study. Mov Disord 1999;14:922–27.
14. Ondo WG, Dat Vuong K, Khan H, Atassi F, Kwak C, Jankovic J. Daytime sleepiness and other sleep disorders in Parkinson's disease. Neurology 2001; 57: 1392–6.
15. Hobson DE, Lang AE, Martin WRW, Razmy A, Rivest J, Fleming J. Excessive daytime sleepiness

and sudden-onset sleep in Parkinson disease: a survey by the Canadian Movement Disorders Group. JAMA 2002;287:455–63.
16. Oerlemans WG, de Weerd AW. The prevalence of sleep disorders in patients with Parkinson's disease: a self-reported, community-based survey. Sleep Med 2002 ;3:147–9.
17. Gagnon JF, Bedard MA, Fantini ML, et al. REM sleep behavior disorder and REM sleep without atonia in Parkinson's disease. Neurology 2002;59:585–9.
18. Schenck C, Bundlie S, Mahowald M. REM behavior disorder (RBD): delayed emergence of parkinsonism and/or dementia in 65% of older men initially diagnosed with idiopathic RBD, and an analysis of the minimum and maximum tonic and/or phasic electromyographic abnormalities found during REM sleep. Sleep 2003;26:A316.
19. Boeve BF, Silber MH, Ferman TJ, Lucas JA, Parisi JE. Association of REM sleep behavior disorder and neurodegenerative disease may reflect an underlying synucleinopathy. Mov Disord 2001;16:622–30.
20. Olson EJ, Boeve BF, Silber MH. Rapid eye movement sleep behaviour disorder: demographic, clinical and laboratory findings in 93 cases. Brain 2000;123:331–9.
21. Oksenberg A, Radwan H, Arons E, Hoffenbach D, Behroozi B. Rapid eye movement (REM) sleep behavior disorder: a sleep disturbance affecting mainly older men. Isr J Psychiatry Relat Sci 2002;39:28–35.
22. Morrison AR. The pathophysiology of REM-sleep behavior disorder. Sleep1998;21:446–9.
23. Gilman S, Koeppe RA, Chervin RD, Consens FB, Little R, An H, et al. REM sleep behavior disorder is related to striatal monoaminergic deficit in MSA. Neurology 2003;61:29–34.
24. Eisensehr I, von Lindeiner H, Jager M, Noachtar S. REM sleep behavior disorder in sleep-disordered patients with versus without Parkinson's disease: is there a need for polysomnography? J Neurol Sci 2001;186:7–11.
25. Wetter TC, Trenkwalder C, Gershanik O, Hogl B. Polysomnographic measures in Parkinson's disease: a comparison between patients with and without REM sleep disturbances. Wien Klin Wochenschr 2001;113:249–53.
26. Factor SA, McAlarney T, Sanchez-Ramos JR, Weiner WJ. Sleep disorders and sleep effect in Parkinson's disease. Mov Disord 1990;5:280–5.
27. Garcia-Borreguero D, Caminero AB, De La Llave Y, Larrosa O, Barrio S, Granizo JJ, et al. Decreased phasic EMG activity during rapid eye movement sleep in treatment-naive Parkinson's disease: effects of treatment with levodopa and progression of illness. Mov Disord 2002;17:934–41.
28. Lowe AD. Sleep in Parkinson's disease. J Psychosom Res 1998; 44:613–7.
29. Chaudhuri KR, Pal S, DiMarco A, Whately-Smith C, Bridgman K, Mathew R, et al. The Parkinson's disease sleep scale: a new instrument for assessing sleep and nocturnal disability in Parkinson's disease. J Neurol Neurosurg Psychiatry 2002;73:629-35.
30. Marinus J; Visser M; van Hilten JJ, Lammers GJ, Stiggelbout AM. Assessment of sleep and sleepiness in parkinson disease. SLEEP 2003;26(8):1049-54.
31. Johns MW. A new method for measuring daytime sleepiness: the Epworth Sleepiness Scale. Sleep 1991;14:540-5.
32. Netzer NC, Stoohs RA, Netzer CM, Clark K, Strohl KP. Using the Berlin Questionnaire to identify patients at risk for sleep apnea syndrome. Ann Intern Med 1999;131:485-91.
33. Senthilvel E; Auckley D; Dasarathy J. Evaluation of sleep disorders in the primary care setting: history taking compared to questionnaires. J Clin Sleep Med 2011;7(1):41-8.
34. Tanasanvimon S, Ayuthaya NI, Phanthumchinda K. Modified Parkinson's Disease Sleep Scale (MPDSS) in Thai Parkinson's disease patients. J Med Assoc Thai 2007; 90: 2277-83.
35. Chaudhuri KR, Martinez-Martin P. Clinical assessment of nocturnal disability in Parkinson's disease: the Parkinson's Disease Sleep Scale. Neurology 2004; 63(8:3): S17-20.
36. Suwanna S, Kitti L. Validation of the Thai SCOPA-Sleep Scale for Assessment of Sleep and Sleepiness in Patients with Parkinson's Disease. J Med Assoc Thai 2011; 94: 2.
37. Phillips B, Young T, Finn L, Asher K, Hening WA, Purvis C. Epidemiology of restless legs syndrome in adults. Arch Int Med 2000;160:2137–41.
38. Lavigne GJ, Montplaisir JY. Restless legs syndrome and sleep bruxism: prevalence and association among Canadians. Sleep 1994;17:739–43.
39. Chokroverty S, Jankovic J. Restless legs syndrome: a disease in search of identity. Neurology 1999;52:907–10.

40. Ondo W, Vuong KD, Jankovic J. Exploring the relationship between Parkinson's disease and restless leg syndrome. Arch Neurol 2002;59: 421–4.

41. Krishnan PR, Bhati M, Behari M. Restless legs syndrome in Parkinson's disease: a case-controlled study. Mov Disord 2003;18: 181–5.

การประเมินความผิดปกติของการหลับในโรคพาร์กินสัน: เปรียบเทียบระหว่างการประเมินโดยแพทย์และใช้แบบสอบถาม

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วัตถุประสงค์: *เพื่อประเมินความผิดปกติของการนอนหลับในผู้ป่วยโรคพาร์กินสันเปรียบเทียบระหว่างการซักประวัติโดยแพทย์ตามปกติและการใช้แบบสอบถามประเมินการนอนหลับที่ใช้กันโดยทั่วไปในผู้ป่วยโรคพาร์กินสันที่ได้รับการ validated เป็นภาษาไทยแล้ว เช่น Modified Parkinson's Disease Sleep Scale (MPDSS), the Thai Epworth Sleepiness Scale (Thai-ESS), Scales for Outcomes in Parkinson's disease-Sleep Scale, Berlin questionnaire และแบบสอบถามการนอนหลับผิดปกติจากศูนย์นิทรรักษ์ศิริราช (Siriraj Sleep Questionnaire)*

วัสดุและวิธีการ: *ผู้ป่วยโรคพาร์กินสันที่มาตรวจตามนัดที่คลินิกโรคพาร์กินสัน โรงพยาบาลศิริราช ผู้ป่วยจะได้รับการแนะนำให้ตอบแบบสอบถาม MPDSS ฉบับภาษาไทย, แบบสอบถาม Epworth sleepiness scale ฉบับภาษาไทย, แบบสอบถาม SCOPA ฉบับภาษาไทย, แบบสอบถาม Berlin questionnaire ฉบับภาษาไทยและแบบสอบถาม การนอนหลับผิดปกติของศูนย์นิทรรักษ์ศิริราช จากนั้นผู้ป่วยจะได้รับการตรวจรักษาโดยแพทย์ตามปกติ*

ผลการศึกษา: *ผู้ป่วยโรคพาร์กินสันที่เข้าร่วมวิจัยทั้งหมด 120 ราย เป็นผู้ชาย 73 ราย (60.8%) ค่าเฉลี่ยอายุ 61.5±12.0 ปี body mass index (BMI) 22.7±3.5 kg/m^2 (BMI ≥30 kg/m^2 in 1.7%) จากผลการวิจัยพบว่า อัตราการนอนหลับผิดปกติที่ได้รับการวินิจฉัยโดยแพทย์ คิดเป็นร้อยละ 59.2 จากผู้ป่วยทั้งหมดและพบว่า อัตราการนอนหลับผิดปกติที่ได้รับการวินิจฉัยโดยแบบสอบถามมาตรฐาน MPDSS คิดเป็นร้อยละ 81.7 ผลการวินิจฉัยความง่วงนอนระหว่างวันโดยแบบสอบถาม ESS คิดเป็นร้อยละ 29.2 ตรวจพบผู้ป่วยที่มีความเสี่ยงต่อภาวะการหายใจอุดกั้นร้อยละ 28.3 โดยแบบทดสอบเบอร์ลิน นอกจากนี้ยังพบว่าแบบสอบถามการนอนหลับผิดปกติจากศูนย์ นิทรรักษ์ศิริราชสามารถตรวจพบอัตราการนอนหลับผิดปกติได้สูงถึงร้อยละ 86.7 และสามารถตรวจพบการวินิจฉัย แยกโรคการนอนหลับผิดปกติในแต่ละชนิดได้มากกว่าแพทย์อย่างมีนัยสำคัญทางสถิติ นอกจากนี้ยังพบว่ามีความสัมพันธ์ที่สูงเมื่อเทียบกับแบบทดสอบ MPDSS*

สรุป: *การใช้แบบสอบถามการนอนหลับที่เป็นมาตรฐานสามารถช่วยในการวินิจฉัยและจำแนกโรคการนอนหลับผิดปกติ ได้ดีกว่าการซักประวัติโดยแพทย์*