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Clinical Study

Dysfunctional sleep beliefs in Parkinson's disease: Relationships with subjective and objective sleep

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ABSTRACT

Disturbed sleep is common in Parkinson's disease and has a detrimental impact on functioning and quality of life. While the progression of the disease contributes to the aetiology of sleep problems in Parkinson's disease, it is unknown whether an individual's beliefs and attitudes about sleep play a role. In this study we sought to investigate whether dysfunctional beliefs and attitudes about sleep could be related to subjective and objective measures of sleep disturbance in Parkinson's disease. Ninety-three patients with Parkinson's disease completed the Dysfunctional Beliefs and Attitudes about Sleep 16 item questionnaire, which comprises four domains: Expectations, Worry/Helplessness, Consequences and Medication. Patients also completed the Pittsburgh Sleep Quality Index questionnaire and Beck Depression Inventory-II. Patients wore actigraphy watches and completed sleep diaries for 2 consecutive weeks, recording measures of sleep disturbance including Sleep Onset and Offset, Wake After Sleep Onset, Sleep Efficiency, and Wake Bouts per hour. Greater dysfunctional beliefs and attitudes in the domains of Worry/Helplessness and Medication were associated with lower perceived sleep quality and greater depressive symptoms. However, no relationships were found between dysfunctional beliefs and attitudes about sleep and any objective actigraphic measure of sleep disturbance. These findings suggest that beliefs and attitudes about sleep in Parkinson's disease are associated with mood disturbance, rather than objective measures of sleep. Thus it is possible that interventions targeting mood may lead to more accurate perceptions of sleep and improved quality of life in Parkinson's disease patients.

1. Introduction

Disturbed sleep is a frequent complaint in many clinical populations and is linked to a range of physical and neuropsychiatric symptoms. Despite being primarily known as a movement disorder, sleep disturbances are being increasingly recognised as an integral feature of Parkinson's disease (PD) [1,2]. Over two thirds of patients are symptomatic [3] with a variety of sleep disorders reported including excessive daytime sleepiness, insomnia, sleep maintenance problems and rapid eye movement sleep behaviour disorder [2–4]. Significantly, sleep problems in PD have been previously linked with physical function, quality of life, depression, psychosis, and an increased risk of developing dementia [3,5,6]. Furthermore, such disturbances also impact upon spousal carer sleep, as well as their perceived level of burden, often providing an impetus for nursing home placement [7,8].

In other clinical populations, research has shown that sleep expectations and being "overly worried" about sleep are factors which may exacerbate sleep disturbance [9]. In turn this heightened worry causes autonomic arousal and emotional distress. This leads to selective attention where an individual can focus on the deficit and overestimate it. Previous studies in non-PD cohorts (such as primary insomnia, late life insomnia, menopause, major depressive disorder and other mood disorders) have demonstrated that individuals with dysfunctional beliefs and attitudes about sleep (DBAS) feel that their health will suffer if they do not attain a minimum number of hours sleeping per night [10–13]. These patient groups are prone to developing a form of "performance anxiety" [14] and may adopt strategies to compensate for this perceived lack of sleep [9]. Such strategies include excessive napping, staying in bed for longer periods or utilising agents such as caffeine or other drugs, all of which may disrupt their sleep–wake patterns further.

The Dysfunctional Beliefs and Attitudes about Sleep 16 item Questionnaire (DBAS-16), is a validated scale that can measure

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these perceptions [15]. Higher ratings on the DBAS-16 tend to be associated with poorer health and wellbeing [9,15] and are correlated with greater levels of sleep disturbance [12,13]. Thus a greater appreciation of these factors may help direct targeted sleep–wake psychological therapies amongst clinical populations.

To our knowledge no work has evaluated DBAS using the DBAS-16 in a sample of PD patients. Therefore, this study was undertaken to identify the level of DBAS in PD and determine whether these perceptions of sleep could be correlated with self-reported sleep disturbance, as measured by questionnaires and, more importantly, with objective measures of sleep disturbance as recorded by actigraphic assessment.

2. Methods

2.1. Recruitment

Ninety-three patients with PD (mean age 63.9 years ± standard deviation [SD] of 7.9 years, 61.3% male) were recruited from the Parkinson's Disease Research Clinic at the Brain and Mind Research Institute, University of Sydney (Table 1). Exclusion criteria were a history of stroke, neurological disorder other than PD, diagnosis of obstructive sleep apnoea, head injury with loss of consciousness $\geqslant$30 minutes, medical conditions known to affect cognition (such as cancer), psychiatric illness, shift work, transmeridian travel within the prior 60 days, and use of medications (other than those for PD) known to affect sleep and/or melatonin secretion including beta-blockers, lithium or benzodiazepines. All patients satisfied the United Kingdom Parkinson's Disease Society Brain Bank criteria [16] and 71% of patients were on dopaminergic medication. Of those on dopaminergic medication there was an average L-dopa dose equivalence of 700 mg (± SD 481 mg). In addition, 22% were taking antidepressant medications. No patients taking hypnotics were included in the study.

Patients were assessed on the Unified Parkinson's Disease Rating Scale – motor symptoms (UPDRS-III) [17] and were staged according to the Hoehn and Yahr (H&Y) scale [18]. None of the patients were deemed as having dementia according to Movement Disorder Society Task Force criteria [19] or major depression by the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition [20] following consensus rating by a neurologist and a neuropsychologist. Mood was further assessed using the Beck Depression Inventory (BDI-II) [21].

Permission for the study was obtained from the University of Sydney research ethics committee and all participants provided written informed consent.

Table 1
Demographic, clinical, self-report, Dysfunctional Beliefs and Attitudes about Sleep 16 item Questionnaire and actigraphy data for patients with Parkinson's disease

	Mean	Standard deviation	n
Demographic data			
Disease duration (years)	5.6	5.1	90
Age (years)	63.9	7.9	93
L-Dopa dose equivalent (mg)	700	481	65
Clinical data			
UPDRS-III	23.0	10.1	93
H&Y	1.9	0.7	92
Self-report data			
PSQI	6.4	3.3	91
BDI-II	9.8	6.1	92
DBAS-16 data			
Total DBAS-16	65.7	24.3	93
Expectations	11.1	4.4	93
Worry/Helplessness	23.9	10.6	93
Consequences	21.2	9.2	93
Medication	9.6	6.2	93
Actigraphy data			
Sleep Onset (hh:mm)	22:42	01:13	93
Sleep Offset (hh:mm)	07:02	01:02	93
WASO (minutes)	51.9	32.1	93
Sleep Efficiency (%)	89.6	6.4	93
Wake Bouts per hour	5.0	2.6	93

BDI-II = Beck Depression Inventory, DBAS-16 = Dysfunctional Beliefs and Attitudes about Sleep 16 item Questionnaire, hh:mm = hours:minutes in 24 hour time, H&Y = Hoehn and Yahr scale, PSQI = Pittsburgh Sleep Quality Index, UPDRS-III = Unified Parkinson's Disease Rating Scale – motor symptoms, WASO = Wake After Sleep Onset.

3. Measures

3.1. DBAS-16

The DBAS-16 asks patients to rate how much they agree with a series of statements relating to sleep [15]. Responses are made using an 11 point Likert scale (0 = strongly disagree, 10 = strongly agree). The more dysfunctional the beliefs of an individual, the higher they will rank each statement resulting in a greater total score.

The four domains of the DBAS-16 are (1) Expectations: for example, I need 8 hours of sleep to feel refreshed and function well the next day; (2) Worry/Helplessness: for example, I am worried that I may lose control over my abilities to sleep; (3) Consequences: for example, I avoid or cancel obligations after a poor night's sleep; and (4) Medication: for example, medication is probably the only solution to sleeplessness.

3.2. Pittsburgh Sleep Quality Index

To evaluate self perceived sleep quality, patients completed the Pittsburgh Sleep Quality Index (PSQI). This is a 19 item questionnaire that creates seven component scores equally weighted from 0–3. The sum of the component scores generates a global score between 0 and 21; therefore, the higher the global score, the worse the sleep quality. Those with a PSQI score more than or equal to 5 are classed as having sleep disturbance [22]. The PSQI has previously been used to assess sleep quality in PD patients [23].

3.3. Actigraphy

Actigraphy is a frequently used and well validated objective measure of sleep–wake behaviour in non-PD [24,25] and PD samples [26,27]. Actigraphy was collected for 14 days according to an established protocol [26] using wrist actigraphy watches (MiniMitter Actiwatch Spectrum; Minimitter-Respironics Inc., Bend, OR, USA) that measure movement and intensity of light exposure. As described previously, patients were instructed to wear the watch on the wrist less severely affected by PD and complete a daily sleep diary [26]. The data were downloaded and scored using Actiware 5.0 software with Actiwatch Firmware Version 01.01.0007 (Minimitter-Respironics Inc.). While it is noted that actigraphy can only identify "rest" intervals where the patient is not moving, the term "sleep" has been used here for ease of interpretation. Manual scoring corrections were applied by a trained technician who incorporated information recorded in the sleep diaries. Naps were excluded so that only one sleep interval was scored for each 24 hour window. The wake threshold value (i.e., the number of activity counts used to define wake) was set to medium sensitivity of 40.0 activity counts per 30 second epoch.

Outcome variables from the actigraphy assessment used in analyses included:

(1) Sleep Onset Time (hh:mm): the average time at which sleep in bed commenced

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