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Brief Communication

Diagnostic value of the REM sleep behavior disorder screening questionnaire in Parkinson's disease

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ABSTRACT

Objective: We aimed to validate the rapid eye movement (REM) sleep behavior disorder (RBD) screening questionnaire (RBDSQ) in 2 independent samples of patients with Parkinson's disease (PD) using different settings when performing the investigations.
Methods: The RBDSQ was administered to two independent samples of 52 and 75 consecutive PD patients investigated with video-polysomnography (vPSG).
Results: In sample A, the RBDSQ identified 46/52 (88.5%) patients correctly. In sample B, 50/75 (66.7%) patients were identified correctly. Considering a cut-off score of ≥ 5 as a positive test result, sample A showed a sensitivity of 0.90 and a specificity of 0.87, sample B showed a sensitivity of 0.68 and a specificity of 0.63. Main differences between both groups were that patients of sample A underwent a sleep history including RBD assessment prior to administration of the RBDSQ, whereas in sample B the RBDSQ was administered during routine work-up.
Conclusions: The diagnostic value of the RBDSQ strongly depends on the clinical setting and may be influenced by the individual's awareness on RBD. This finding is a critical issue which deserves clarification before use of this and other questionnaires can be recommended in epidemiological studies.

1. Introduction

Rapid eye movement (REM) sleep behavior disorder (RBD) is clinically characterized by the intermittent loss of physiological skeletal muscle atonia during REM sleep with the appearance of elaborate motor activity associated with dream mentation [1]. Apart from the characteristic clinical picture, polysomnography (PSG) demonstrating REM sleep without atonia is required for establishing a definite diagnosis of RBD [2]. The RBD screening questionnaire (RBDSQ) was developed and validated to meet the need for an easily applicable and short diagnostic screening tool [3]. It was shown to have a high sensitivity for RBD in both sleep-disorder patients and healthy controls [3]. Up to 46% of Parkinson's disease (PD) patients have RBD [4–6]. Since the usefulness of the RBDSQ in PD is still controversial [7–9], we aimed to validate the RBDSQ in 2 independent samples of PD patients using different settings when performing the investigations.

2. Methods

2.1. Patient samples and procedures

All patients in this study were referred to video-PSG (vPSG) at the sleep laboratory of Innsbruck University or at the Paracelsus-Elena-Klinik Kassel because of reported sleep disturbances, and underwent single or multiple night v-PSG according to clinical considerations. The RBDSQ [3] was completed prior to vPSG.

All patients analyzed in this study consented to scientific evaluation of their clinical data. The Ethical Committee of the Landesärztekammer Hessen agreed to the project.

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Patient sample A was specifically selected to validate the RBDSQ in PD. It consisted of 52 consecutive PD patients (23 Innsbruck, 29 Kassel) who underwent a sleep history including assessment of the presence of RBD prior to administration of the RBDSQ. Sixty-two percent of patients underwent one night v-PSG, 38% had multiple night vPSG. RBD was diagnosed according to the criteria of the International Classification of Sleep Disorders, 2nd revision (ICSD-2) [2] based on (1) a history suggestive of RBD or presence of clear dream-enacting behaviors during REM sleep documented on vPSG, and (2) a qualitative finding of REM sleep without atonia in the video-polysomnography defined as presence of an excessive amount of phasic or tonic EMG activity in the chin or extremity muscles following the recommendations of the American Academy of Sleep Medicine.

Patient sample B consisted of 75 PD patients (75 Kassel) in whom the RBDSQ was administered during routine work-up without prior interview on possible RBD. Eighty-three percent of patients underwent one night of v-PSG, 17% had multiple night v-PSG. RBD was diagnosed according to the criteria of the ICSD-2 [2] based on (1) the presence of clear dream-enacting behaviors during REM sleep documented on vPSG, and (2) a qualitative finding of REM sleep without atonia in the vPSG defined as presence of an excessive amount of phasic or tonic EMG activity in the chin or extremity muscles following the recommendations of the American Academy of Sleep Medicine. Vocalizations during REM sleep alone were not sufficient to be rated as dream enacting behavior.

2.2. Statistical analysis

In case of normal distribution, data were given as mean values (±standard deviation) and independent t-tests were applied; in case of non-normal distribution, median values (range) were given and Mann–Whitney tests were calculated. For categorical variables, Fisher's exact test was applied. The diagnostic value of the RBDSQ was calculated by the area under the curve (AUC). The primary outcome measures were to evaluate if a cut-off score of 5 is appropriate for RBD screening in PD, and if the RBDSQ is suitable for RBD detection in subjects without prior information on RBD, as this most likely reflects the typical situation in epidemiologic studies. A p-value < 0.05 was considered significant.

3. Results

3.1. Clinical characteristics (Table 1)

3.1.1. Patient sample A

Patient sample A consisted of 52 PD patients of whom 37 subjects (71.2%) had RBD and 15 (28.8%) had no RBD. PD patients with and without RBD differed in the rate of selective serotonin reuptake (SSRI) or serotonin-norepinephrine reuptake inhibitor (SNRI) use (RBD-PD vs. Non-RBD-PD: 17 (46%) vs. 1 (7%), p = 0.009). No differences were found for sex (RBD-PD vs. Non-RBD-PD: 20 men (54%) vs. 6 (40%), p = 0.541), age (67 ± 8 vs. 65 ± 7, p = 0.505), disease duration (7 (1–30) vs. 4 (1–10), p = 0.180), H&Y stage (3 (1–5) vs. 3 (1–3), p = 0.542), sleep-related breathing disorder [SRBD (RBD-PD vs. Non-RBD-PD: 17 SRBD (46%) vs. 6 (40%), p = 0.542)], levodopa dosage (450 (0–1400) vs. 400 (0–1000) mg/day, p = 0.590), and dopamine agonist equivalent dosage (100 (0–2000) vs. 175 (0–2400) mg/day, p = 0.548).

3.1.2. Patient sample B

Patient sample B consisted of 75 PD patients. Sex, age, disease duration, H&Y stage, SRBD, and dopamine agonist equivalent dosage were comparable to sample A, whereas levodopa dosage was higher and use of SSRIs or SNRIs was lower in patient sample B. 56 patients (75%) were identified with RBD, 19 (25%) had no RBD. Both groups did not differ in sex (39 men (69.6%) vs. 11 men (64.7%), p = 0.348), age (RBD-PD vs. Non-RBD-PD: 67 (48–77) vs. 67 (65–71) years, p = 0.380), disease duration (7 ± 5 vs. 8 ± 6 years, p = 0.726), H&Y stage (3 (2–5) vs. 3 (3–4), p = 0.937), SRBD (RBD-PD vs. Non-RBD-PD: 16 SRBD (29%) vs. 6 (32%), p = 1.000), levodopa dosage (753 (200–1800) vs. 580 (40–1043) mg/day, p = 0.699), dopamine agonist equivalent dosage (200 (50–840) vs. 185 (50–400) mg/day, p = 0.550), and SSRI/SNRI intake (RBD-PD vs. Non-RBD-PD: 6 SRBD (11%) vs. 4 (20%), p = 0.442).

Table 1
Clinical characteristics of both investigated patient samples.

Demographics	Patient sample A (n = 52)	Patient sample B (n = 75)	p-value
Age, y	69 (46–83)	67 (48–77)	0.837[a]
Gender, m (%)	26 (50)	50 (67)	0.068[b]
Disease duration, y	5 (1–30)	8 (2–20)	0.248[a]
H&Y stage	3 (1–5)	3 (2–5)	0.263[a]
LD dose mg/day	413 (0–1400)	730 (200–1800)	<0.001[a]
DA dose mg/day	102 (0–2400)	200 (50–840)	0.248[a]
SSRI/SNRI intake, n (%)	18 (35)	10 (13)	0.008[b]
Cholinesterase inhibitor intake, n (%)	1 (2)	0 (0)	N.A.
Benzodiazepine intake*, n (%)	3 (6)	8 (11)	0.523[b]
SRBD, n (%)	23 (44)	22 (29)	0.084[b]
Mild (AHI 5–15/h), n (%)	15 (29)	13 (17)	
Moderate (AHI 15–30/h), n (%)	3 (6)	5 (7)	
Severe (AHI > 30/h), n (%)	5 (10)	4 (5)	
RBD, n (%)	37 (71)	56 (75)	0.688[b]
RBDSQ score	6 (0–12)	6 (0–11)	0.364[a]

Legend. All values are given as median (range) or frequencies (percentages).
Abbrevations: y, years; m, men; H&Y stage, Hoehn and Yahr stage; LD, levodopa; DA, dopamine agonist equivalent dosage as calculated according to Möller et al. J Neurol 2005; RBDSQ score, REM sleep behavior disorder screening questionnaire score; SNRI, serotonin-norepinephrine reuptake inhibitors; SRBD, sleep-related breathing disorder; SSRI, selective serotonin reuptake inhibitors.
[a] Based on Mann–Whitney test.
[b] Based on Fisher's exact test (2-sided).
* No patient received treatment for RBD at time of video-polysomnography.