

eSupplementary Table 3: Smaller case series of sleep disturbance in movement disorders

Disorder	Author	Year	Cohort	Assessment	Outcome
Parkinsonism	Tison et al. ¹	1995	MSA (2)	PSG	RBD preceded other symptoms and signs of disease. PSG showed little N1 and N2 in one patient
Parkinsonism	Vetrugno et al. ²	2009	MSA (2)	One night of PSG	Documented status dissociatus. During disease progression RBD diminished but sleep became more abnormal, suggesting the potential progression of RBD into SD
Parkinsonism	Vetrugno et al. ³	2007	MSA (3)	One night of PSG	All patients had paradoxical breathing during sleep, increased WASO, reduced sleep efficiency and RBD. One patient had RLS with PLMS
Parkinsonism	Hamada et al. ⁴	2015	MSA (2)	PSG	Both diagnosed with OSA
Parkinsonism	Infante et al. ⁵	2019	CBD (3)	v-PSG	Mean atonia index was reduced, dystonia and myoclonus persistent during sleep
Parkinsonism	Roche et al. ⁶	2007	CBD (5)	Overnight PSG, MSLT, PSQI, ESS	All five patients had insomnia, four had PLMS, and two had sleep disordered breathing (OSA and CSA, and upper airway resistance syndrome). PSQI was abnormal in all patients. RBD or EDS was not reported
Spinocerebellar Ataxia	Dang et al. ⁷	2010	SCA1 (2)	PSG, MSLT, ESS	PSG showed moderate OSA in Case 1. Case 2 presented with EDS and a mean sleep latency of 5 minutes on the MSLT
Spinocerebellar Ataxia	Boesch et al. ⁸	2006	SCA6 (5) from 3 families	IRLSSG, two nights of PSG	40% reached the criteria for RLS. Increased PLMS index in 80% of patients.
Spinocerebellar Ataxia	Hsu et al. ⁹	2016	SCA2 (3) from one family	PSG, ESS, clinical interview to determine insomnia	All cases had snoring and EDS. RLS and RBD detected in one case. Insomnia and EDS significantly improved with use of antidepressants
IgLON5	Gaig et al. ¹⁰	2019	IgLON (5)	v-PSG, MSLT and actigraphy	Stridor, OSA and RBD were present in all five patients. Movements in all five patients was frequently observed, mostly during N2 and REM sleep. MSLT showed altered sleep initiation
DRPLA	Licht et al. ¹¹	2002	DRPLA (3)	Clinical examinations	Severe OSA was reported in two cousins
DRPLA	Kim et al. ¹²	2018	DRPLA (5)	PSG	PSG evaluation showed that the patient and his daughters presented with RWA and to various degrees RBD, reduced sleep efficiency and increased PLMS. They had no respiratory related sleep problems
DRPLA	Miyamoto et al. ¹³	1996	DRPLA (2)	PSG	PSG revealed an increased percentage of slow wave sleep in both patients (30.2% and 70.4%), with sleep spindles occurring in N3. Sleep apnea was not observed
Wilson's Disease	Tribl et al. ¹⁴	2014	WD (4)	v-PSG RBDQ-HK, RBDSQ, MSQ, PSQI, ESS, BDI	RBD presented as an initial symptom in three of the four cases
Neuroacanthocytosis	Hori et al. ¹⁵	1985	NA (2)	PSG	PSG recordings were characterised by high voltage slow activity during REM, with increased number of awakenings and decreased slow wave sleep. One patient had an average of 40 episodes of predominantly central apnea per night
Neuroacanthocytosis	Dolenc-Grošelj et al. ¹⁶	2005	ChAc (2)	PSG	Sleep apnea, RLS or PLMS were not detected. Increased latency was detected in one patient. Arousals were frequent and sleep efficiency was low. REM sleep was decreased with a prolonged latency in both patients

Neuroacanthocytosis	Weaver et al. ¹⁷	2019	MLS (5)	PSG	A retrospective review, which found that three cases had severe OSA confirmed by PSG.
Neuroacanthocytosis	Ghorayeb et al. ¹⁸	2008	ChAc (3) MLS (2)	PSG, ESS	Mean total sleep time was globally reduced, but mean sleep latency was within normal range. WASO was relatively high and median sleep efficacy was reduced. V-PSG revealed reduction of abnormal movements during sleep, RBD was not observed. Only one patient had abnormal ESS score and MSLT, and OSA
NBIA	Illingworth et al. ¹⁹	2014	PLAN (5)	Clinical reviews, respiratory sleep study	When lights were on at night, patients presented with CSA
NBIA	Blake et al. ²⁰	2016	PLAN (2)	Clinical review	A sleep study showed one patient had central and OSA
NBIA	Bohlega et al. ²¹	2016	PLAN (4); two families (early onset parkinsonism)	Clinical evaluation	One presented with RBD, and all four had unspecified sleep disorders and three had sleep fragmentation
NBIA	Chard et al. ²²	2019	BPAN (3)	Clinical evaluation	One patient had difficulty with sleep and frequent night-time awakenings. A second case had difficulty sleep and wakes frequently throughout the night
NBIA	Verhoeven et al. ²³	2014	BPAN (3)	EEG, clinical evaluation	One patient showed sleep disturbances and nightly incontinence
NBIA	Fantini et al. ²⁴	2010	PKAN (3)	v-PSG	Reduced total sleep time was seen in two patients with low sleep efficiency. Percentage of N3 was normal to elevated in two patients and absent from one patient. None had apnea (AHI <5). One patient showed mild PLMS, exclusively to NREM. No EMG activity was observed in NREM
Tic Disorders	Müller et al. ²⁵	1994	TS+RLS (1) RLS (2)	PSG	Mother and son both showing RLS with son also having TS

Key: AHI: Apnea Hypopnea Index, BDI: Beck's Depression Inventory, BPAN: Beta-propeller protein-associated neurodegeneration, CBD: Corticobasal Degeneration, ChAc: Chorea-Acanthocytosis, CSA: Central Sleep Apnea, DRPLA: Dentatorubral-pallidolusian atrophy, EDS: Excessive Daytime Sleepiness, EEG: Electroencephalogram, EMG: Electromyography, ESS: Epworth Sleepiness Scale, IRLSSG: International Restless Legs Syndrome Study Group, MLS: McLeod's Syndrome, MSA: Multiple System Atrophy, MSLT: Mean Sleep Latency Test, MSQ: Mayo Sleep Questionnaire, N3: Non-Rapid Eye Movement Sleep stage 3, NA: Neuroacanthocytosis, NBIA: Brain Iron Accumulation Disorders, NREM: Non-Rapid Eye Movement Sleep, OSA: Obstructive Sleep Apnea, PD: Parkinson's Disease, PLAN: PLA2G6-associated neurodegeneration, PLMS: Periodic Leg Movements during Sleep, PKAN: Pantothenate kinase-associated neurodegeneration, PSG: Polysomnography, PSP: Progressive Supranuclear Palsy, PSQI: Pittsburgh Sleep Questionnaire Index, RBD: REM-sleep Behaviour Disorder, RBDSQ: REM Sleep Behavior Disorder Screening Questionnaire, RBDQ-HK: REM Sleep Behavior Disorder Screening Questionnaire Hong Kong version, RLS: Restless Leg Syndrome, RWA: REM-sleep Without Atonia, SCA: Spinocerebellar Ataxia, TS: Tourette's Syndrome, v-PSG: Video Polysomnography, WASO: Wake After Sleep Onset, WD: Wilson's Disease.

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