Supplemental Table 4. Studies reporting the prevalence of sleep disorders in multiple sclerosis

Study (Year)	Region/ Sub-Region	Source/ Population	Prevalence Day/ Period	Diagnostic Criteria: MS/ Established By	Diagnostic Criteria: sleep disorders/ Established By	Crude Overall Prevalence (95%CI)	Age-Standardized Overall Prevalence (95%CI)	Crude Prevalence (95%CI)		Standardized Prevalence (95%CI)		Quality Score
								Males	Females	Males	Females	
Auger[60] (2005)	Canada/ Quebec	MS outpatient clinic, French-Canadians	NR	Neurologist diagnosed: Criteria NR	Questionnaire: IRLSSG criteria	RLS 75/200= 37.5%	NR	NR	NR	NR	NR	3/9
Braley[43] (2012)	United States/ Michigan	University of Michigan MS clinic database patients referred for polysomnography	March 1999-June 2010	Neurologist diagnosed: Criteria NR	OSA/ Polysomnography AHI of ≥5 episodes per hour of sleep CSA central apnea index of ≥5 episodes per hour of sleep, in the absence of severe OSA	OSA 27/48 = 56.3% CSA 2/48 = 4.17% Both 3/48 = 6.25%	NR	NR	NR	NR	NR	5/9
Deriu[44] (2009)	Italy/ Cagliari	MS Outpatient clinic, General	January 2007-	Neurologist diagnosed:	Questionnaire: IRLSSG criteria	RLS 29/202 = 14.4%	NR	7/67 = 10.4%	22/135 = 16.3%	NR	NR	5/9

		Hospital S. Michele/consecutive patients without iron deficiency, renal failure, other neurological diseases, pregnancy, recent relapse or recent MS diagnosis	December 2007	McDonald 2001								
Dias[45] (2012)	United States/ California	University of California Davis Neurology MS Clinic/ consecutive patients aged ≥18 years old	September 28, 2010-January 25, 2011	Self-report	STOP-BANG questionnaires, ESS	STOP high risk for OSA 43/103 = 41.7% Previously diagnosed with OSA 2/103 = 1.94%	NR	STOP BANG high risk for OSA 22/29 = 76%	STOP BANG high risk for OSA 21/74 = 28%	NR	NR	2/9
Fragoso[47] (2011)	Brazil	MS outpatient clinics across 4 different Brazilian cities aged 18-70 years	November 2009-December 2009	Neurologist diagnosed: McDonald 2001	Interviews/ IRLSSG criteria Restless Legs Syndrome Rating Scale	RLS 46/80 = 57.5% Mild RLS 7/80 = 8.75%	NR	NR	NR	NR	NR	5/9

						Moderate 23/80 = 28.8% Severe 9/80 = 11.3%						
Ferini-Strambi[46] (1994)	Italy/ Milan	MS Center of the Scientific Institute H San Raffaele/ EDSS <6.0, duration of disease longer than 2 years, aged 25-55 years, no concurrent medical diseases, no psychiatric disorders before MS diagnosis, no history of alcohol or drug abuse, no medications for 2 weeks before testing		Neurologist diagnosed: Poser	Polysomnography/ PLM: anterior tibia muscle EMG activity lasting 0.5-5sec in association with ≥5 consecutive movements having an interval between 4-90 sec. Sleep Apnea: AHI of ≥5	PLM 9/25 = 36.0% Sleep Apnea 3/25 = 12.0%	NR	NR	NR	NR	NR	4/9
Gomez-Choco[48]	Spain/ Barcelona	MS outpatient clinic/	NR	Neurologist diagnosed: Poser	Semi-structured interviews.	RLS 18/135 = 13.3%	NR	RLS 6/53 =	RLS 12/82 =	NR	NR	5/9

(2007)		consecutive patients			RLS/ IRLSSG criteria RBD/ International Classification of Sleep Disorders-2 criteria and confirmed by video	RBD 3/135 = 2.22%		11.3%	14.6%			
Kaminska[49] (2012)	Canada/ Montreal	MS outpatient clinic Montreal Neurological Hospital, EDSS 0-7.0, no relapses for 30 days before screening, no chronic steroids for ≥6 months, excluding pregnancy, cognitive or psychiatric conditions precluding consent, other	July 2007-February 2010	Neurologist diagnosed: McDonald 2001	Questionnaire: Pittsburgh Sleep Quality Index, RLS questionnaire using IRLSSG criteria, narcolepsy questionnaire, RBD questionnaire, FSS Polysomnography MSLT	OSA (AHI ≥15) 36/62 = 58.1% RLS 17/62 = 27.4% RBD 2/62 = 3.2% Narcolepsy 1/62 = 1.6%	NR	NR	NR	NR	NR	4/9

		significant neurological, pulmonary, otorhinological, medical disorders, depression in last year, use of medications for RLS, treatment for OSA, FVC <60%										
Li[50] (2012)	United States	Nurses' Health Study (NHS) II/ all women	1989-June 2005	Self-report confirmed by medical records	Questionnaire: IRLSSG criteria and ≥ 5 restless legs/month, Severe ≥ 15 restless legs/month	RLS 41/264 = 15.5% Severe RLS 26/264 = 9.85%	NR	NR	RLS 41/264 = 15.5% Severe RLS 26/264 = 9.85%	NR	NR	6/9
Manconi [51] (2007)	Italy/ Milan	Neuroimaging Research Unit of San Raffaele Institute and Department of Neurology, University of Pisa/consecutiv	NR	Neurologist diagnosed: McDonald 2001	Interview: IRLSSG criteria frequency 1/week in the past 6 months	RLS 51/156 = 32.7%	NR	NR	NR	NR	NR	5/9

		e MS patients excluding those taking dopaminergic or antidopaminergic drugs, diseases known to be induced by or related to RLS, other neurological diseases, MS diagnosis within 6 months, history of alcohol or drug abuse, MMSE <24										
Manconi [52] (2008)	Italy/ Milan	Neuroimaging Research Unit of San Raffaele Institute/consecutive MS patients excluding those treated with	NR	Neurologist diagnosed: McDonald 2005	Interview: IRLSSG criteria frequency 1/week in the past 6 months	RLS 30/82 = 36.6%	NR	NR	NR	NR	NR	6/9

		dopaminergic, anti-dopaminergic, opioids, anti-epileptic central or peripheral myorelaxant drugs, no alcohol or drug abuse, no relapse or steroids within 6 months										
Manconi [53] (2008)	Italy	20 sleep centers across Italy, 18-65 years Exclusion criteria: neurologic disorders (other than MS for the patient group); specific dis-eases known to be induced by or related to RLS;	February 2006-October 2006	Neurologist diagnosed: McDonald 2001	Interview: IRLSSG criteria frequency 2/week in the past 6 months	RLS 164/861 = 19.0% (16.6-21.8)	NR	NR	NR	NR	NR	7/9

		pregnancy; previous or current treatment with clonazepam, dopamine agonists (except if used for a definite RLS diagnosis), or antidopaminergic; history of alcohol or drug abuse; MMSE <24; recent MS diagnosis within 6 months, relapse within 3 months, treatment with any dose of steroids during last 3 months										
Miri[54] (2013)	Iran/ Tehran	MS outpatient clinic, Sina	January 2010-	Neurologist diagnosed:	Interview IRLSSG criteria	RLS 57/205 = 27.8%	NR	8/41 = 19.5%	49/164 = 29.9%	NR	NR	5/9

		Hospital/ consecutive patients excluding those with chronic renal failure, hypothyroidism, diabetes, pregnancy, MS diagnosis within last 6 months, relapse within last 3 months	April 2010	McDonald 2001								
Moreira[55] (2008)	Brazil	MS outpatient clinic/ consecutive patients	NR	Neurologist diagnosed: Criteria NR	Questionnaire IRLSSG criteria	RLS 12/44 = 27.3%	NR	4/12 = 33.3%	8/32 = 25%	NR	NR	5/9
Poirier[56] (1987)	Canada	Neurology clinic, previously typed for HLA-A, B, C and DR	NR	Neurologist diagnosed: Schumacher	Questionnaire and clinical interview followed by MSLT for suspicious cases /Criteria for narcolepsy NR	Daytime sleep attacks 54/70 = 77% Cataplectic attacks 39/70 = 56% Narcolepsy	NR	NR	NR	NR	NR	2/9

						0/70 = 0%						
Shaygannejad[57] (2013)	Iran/ Isfahan	MS outpatient clinic, University Hospital of Kashani excluding use of dopaminergic and antidopaminergic drugs, renal failure, pregnancy, sideropenic anemia, MS diagnosis in the last 6 months, MS relapse within the last 3 months, history of alcohol or drug abuse, or use of high dose steroids in last 6 months	September 2011-December 2011	Neurologist diagnosed: McDonald 2001	Interview IRLSSG criteria	RLS 82/126 = 65.1%	NR	60/96 = 62.5%	22/30 = 73.3%	NR	NR	5/9

Tachibana[58] (1994)	United Kingdom/ London	MS clinic/ consecutive patients	NR	Neurologist diagnosed: McDonald 1986	Self-report sleep symptoms and polysomnography	OSA 2/28 = 7.14%	NR	NR	NR	NR	NR	3/8
Vavrov[59] (2012)	Czech Republic/ Prague	MS Centre, Department of Neurology Faculty of Medicine, excluding dopaminergic and anti-dopaminergic drugs, renal failure, pregnancy, sideropenic anaemia, MS diagnosis in last 6 months, relapse within last 3 months	April 2009-December 2009	Neurologist diagnosed: McDonald 2001	Semi-structured interview IRLSSG criteria/All 4 criteria in their lifetime	RLS 245/765 = 32% (28.7–35.4) Before MS onset: 49/765 = 6.40%	NR	NR	NR	NR	NR	6/9

NR: Not Reported, RLS: Restless Legs Syndrome, IRLSSG: International Restless Legs Syndrome Study Group, OSA: Obstructive Sleep Apnea, CSA: Central Sleep Apnea, AHI: apnea-hypopnea index, PSQI: Pittsburg Sleep Quality Index, RBD: Sleep Behavior Disorder, PLM: Periodic Limb Movement