

High Prevalence of Sleep Disorders in Multiple Sclerosis

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Introduction

Fatigue is a frequent and debilitating symptom in multiple sclerosis (MS). We routinely screen all of our patients for sleep disorders with a simple questionnaire. If appropriate, polysomnography (PSG) is scheduled. The frequent findings of previously unrecognized sleep disorders in our MS patients suggested that sleep disorders might contribute to the high prevalence of the symptom of fatigue in these patients. This retrospective study was undertaken to determine the frequency of concurrent sleep disorders in our MS patient population.

Methods

The present study involved a retrospective chart review of 102 sequential patients who had a diagnosis of clinically definite MS (CDMS), in order to investigate the prevalence of sleep disorders confirmed with PSG (and MSLT when appropriate). Measured were patient demographics, length of time since the diagnosis of CDMS, the type of sleep disorder, the Respiratory Disturbance Index (RDI), and the Arousal Index (AI). The correlation of the type of sleep disorder found with a measure of MS clinical function, the Multiple Sclerosis Functional Composite (MSFC) and it subsets was measured. In addition, the effect of treatment of the sleep disorder on the MSFC, when available, was tabulated.

Results

The patient characteristics are shown in Table 1. Of the 102 patients, 31 were male and 71 were female with a mean age of 45.6. Adjusting for missing data the mean duration of MS symptoms was 10.8 years (range 1-45) and the mean length of time since confirmed MS diagnosis was 7.6 years (range 1-44). The average male weight was 191 lbs and the average height was 70.9 inches; the average female weight was 178 lbs and the average female height was 65.2 inches.

Table 1. Patient Characteristics

Mean Age	45.6 years (22 to 85) Range
Sex of Patients	71 Female (69.6%) 31 Male (30.4%)
Mean Duration of Disease	10.8 years (1 – 45 years) Range
Mean Weight	Male – 191 lbs Female – 178 lbs
Total Patients	102

Upon review of the 102 charts, fifty (50) patients or 49% had a concurrent sleep disorder diagnosis confirmed by PSG. Figure 1 illustrates the distribution of the sleep disorders found.

The sleep diagnoses found were as follows: 32 with obstructive sleep apnea (OSA), 3 with upper airway resistance syndrome (UARS), 15 with periodic limb movement disorder (PLMD), 1 with idiopathic hypersomnia, and 5 with abnormal PSG with elevated arousal index due to unknown etiology. Several of the patients had two diagnoses (9 with OSA and PLMD, 2 with UARS and PLMD). Of the patients with OSA, the mean weight for women was 210 lbs and the mean weight for men was 186 lbs. The relationship between weight and Respiratory Disturbance Index indicated there was a significant correlation (Spearman rank correlation) of $p = 0.001$. There were no other significant correlations.

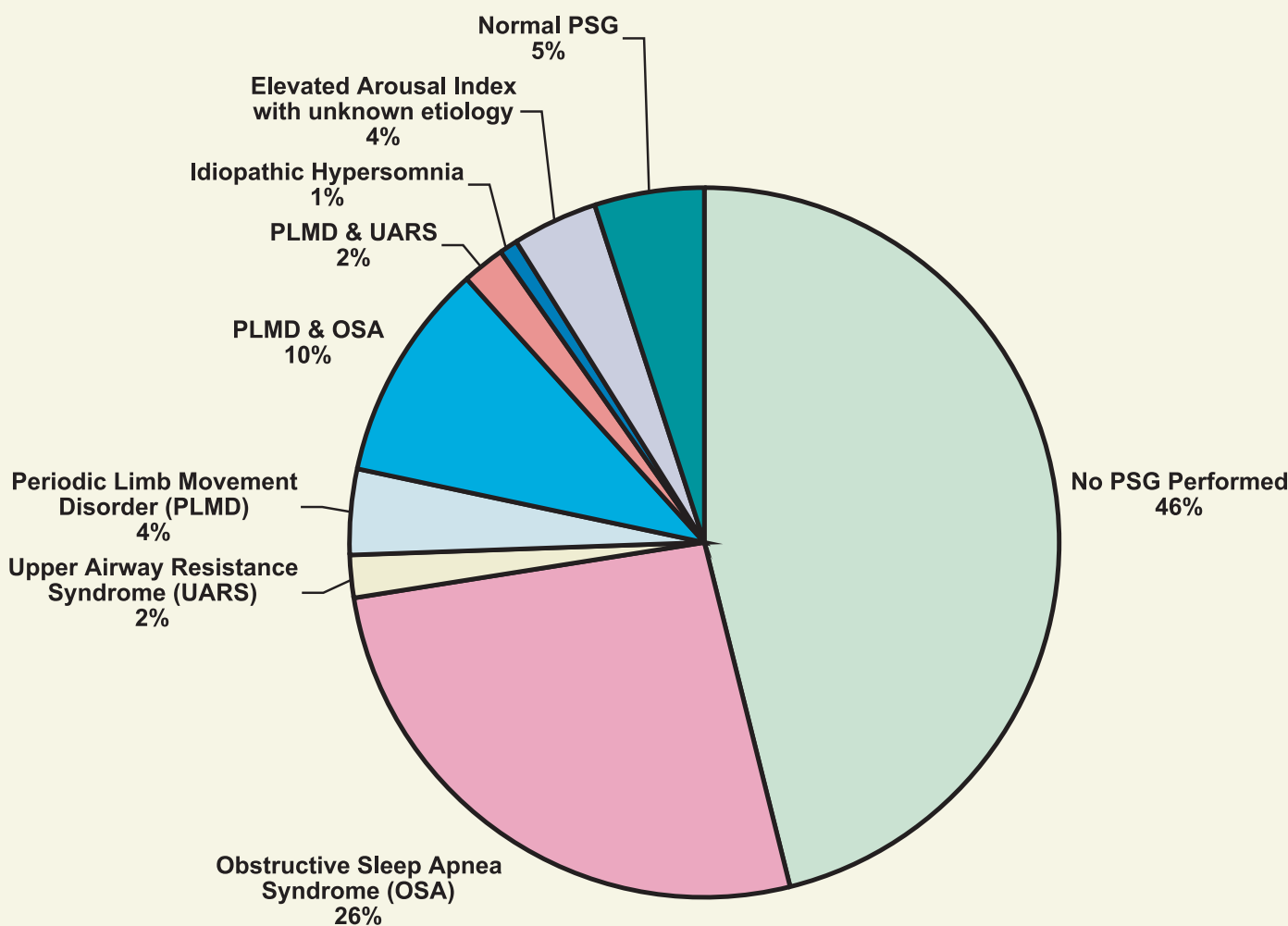


Figure 1. Prevalence of Sleep Disorders in 102 MS Patients

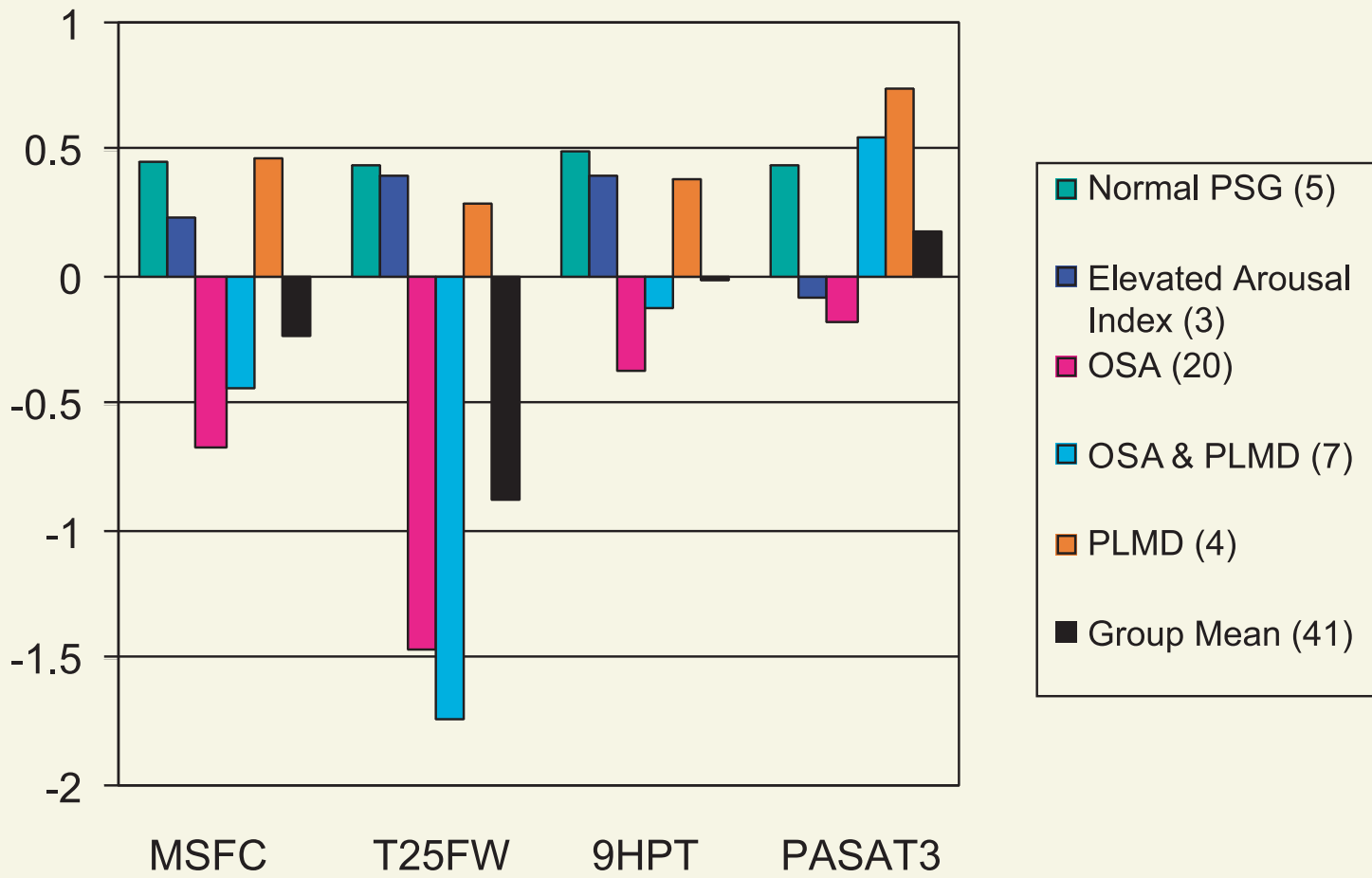


Figure 2. Mean MSFC Scores for Various Groups of MS Patients With Sleep Disorders

Forty-one (41) of the MS patients who had sleep disorders had been tested utilizing the Multiple Sclerosis Functional Composite (MSFC)¹. The MSFC is a widely used clinical evaluation measuring ambulation (Timed 25 foot walk [T25FW]), upper extremity function (9 hole peg test [9HPT]), and cognitive function (Paced Attention Serial Addition Test [PASAT3]). Table 2 and Figure 2 show these results.

As shown in Figure 2, it appears that the OSA group of MS patients had greater baseline disability than the other groups. This was true for the MSFC composite, and for all subsets.

Table 2. MSFC Scores for various groups of MS patients with Sleep Disorders

Sleep Disorders	Mean MSFC	Mean T25FW	Mean 9HPT	Mean PASAT3
Normal PSG (5)	.4605	.4423	.4947	.4445
Elevated Arousal Index (3)	.2402	.4002	.4057	-.0854
OSA (20)	-.6702	-1.4664	-.3718	-.1723
OSA & PLMD (7)	-.4346	-1.7318	-.1261	.5533
PLMD (4)	.4758	.2955	.3893	.7426
UARS & PLMD (1)	1.2599	.4555	2.4866	.8254
Idiopathic Hypersomnia (1)	.6375	.3573	.3159	1.2394
All Patients Means (41)	-.2347	-.8791	-.0065	.1812

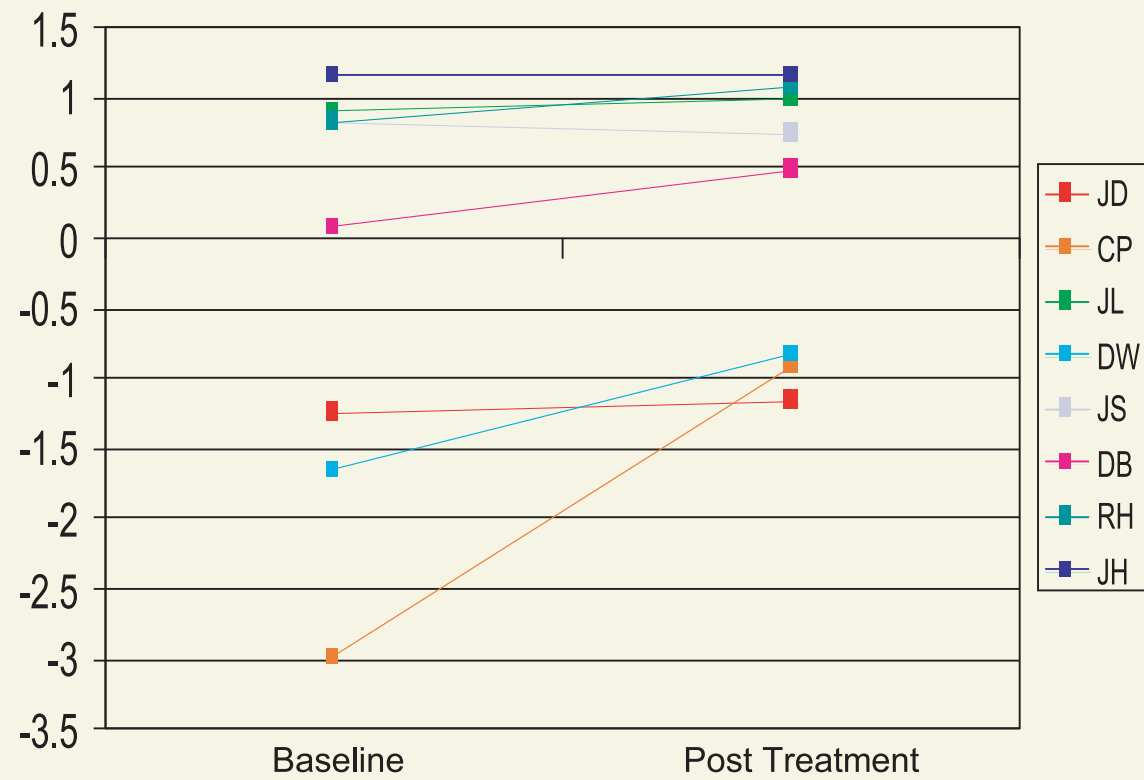


Figure 3. PASAT3 Scores for 8 MS Patients with Obstructive Sleep Apnea Before and After Treatment with CPAP

Treatment Effects

Eight (8) patients in the OSA only group had MSFC evaluations prior to and after initiating treatment with CPAP. Figure 3 shows the effect of treatment of the OSA on the PASAT3 (cognitive function test) for the 8 patients. This was the only subset of the MSFC for which the mean was significantly different after treatment, with an improvement of 0.4554 ($p = 0.04$). There was no significant change in the T25FW (walking), the 9HPT (hand function) or the composite score.

Overall, considering the before and after treatment MSFC scores of all patients who were treated for sleep disorders for whom we have data, the PASAT3 was improved by 0.2420 ($p = 0.006$), while there was no significant change in the composite or the other subsets.

Conclusions

1. Sleep disorders appear to be more prevalent in the MS population than has been reported in the general population, occurring in 49% of the MS patients in this series. Epidemiological studies estimate that 2 to 5% of the general population meets the minimal diagnostic criteria for OSA², and the prevalence of PLMD in the general population ranges from 5% in subjects 30-50 years of age, up to 44% of patients 65 and older³.
2. These striking results suggest the need for screening for sleep disorders in MS patients, especially those with fatigue or cognitive difficulties.
3. Preliminary evaluation suggests proper treatment of sleep disorders may improve the clinical status of MS as measured by the MSFC.
4. Research regarding the effect of successful treatment of sleep disorders on the pathophysiology of MS is warranted.

Acknowledgements

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References

- 1 Fischer JS, Rudick RA, Cutter GR, Reingold SC. The Multiple Sclerosis Functional Composite Measure (MSFC): an integrated approach to MS clinical outcome assessment. National MS Society Clinical Outcomes Assessment Task Force. Mult Scler 1999;5(4):244-250.
- 2 Bassiri A, Guilleminault C. Clinical features and evaluation of obstructive sleep apnea-hypopnea syndrome. In *Principles and Practices of Sleep Medicine*, 3rd ed. Kryger MH, Roth T, Dement WC, eds. WB Saunders, Philadelphia. 2000. p. 869.
- 3 Montplaisir J, Nicolas A, Godbout R, Walters A. Restless legs syndrome and periodic limb movement disorder. In *Principles and Practices of Sleep Medicine*, 3rd ed. Kryger MH, Roth T, Dement WC, eds. WB Saunders, Philadelphia. 2000. p. 743.