

# Sleep Patients with Daytime SOREMs Exhibit More Daytime Sleepiness but Similar Fatigue

Alison L. Gibbs, PhD, PStat

March 10, 2011

*Summary:* This report considers whether sleep clinic patients with daytime SOREMs exhibit greater daytime sleepiness and fatigue than patients who did not have daytime SOREMs. Sleepiness was measured by score on the Sleepiness Scale and by time to fall asleep on the Mean Sleep Latency Test and the Maintenance of Wakefulness test. There is some evidence that patients with daytime SOREMs have slightly higher scores on the Sleepiness Scale and there is strong evidence that mean sleep latency is less for patients with daytime SOREMs. There is no evidence that the SOREM and no SOREM groups differ in their level of fatigue.

# 1 Introduction

This report gives a summary of the analyses performed on data from the study “SOREMs in sleep disorder patients: association with sleepiness and fatigue”. Data were collected retrospectively from charts of sleep clinic patients. All patients considered in the analysis spent two consecutive nights in the sleep, with a Mean Sleep Latency Test (MSLT) carried out during the day following the first night and a Maintenance of Wakefulness Test (MWT) carried out during the day following the second night. Patients with gaps of up to 10 days between the two nights in the sleep clinic were retained in the analysis. Patients who experienced Sleep Onset Rapid Eye Movement (SOREM) during the MSLT were classified as the SOREM group and were compared with the patients who did not have SOREMs. Data were available for 221 patients in the SOREM group and 223 patients in the no SOREM group.

In this report we consider whether sleep patients who have daytime SOREMs exhibit more daytime sleepiness or fatigue than sleep patients not having daytime SOREMs. Daytime sleepiness is measured three ways: score on the Sleepiness Scale from 1 to 7, mean sleep latency on the MSLT, and mean sleep latency on the MWT. Fatigue is measured by the score on the Fatigue Scale from 1 to 7. On both the Sleepiness and Fatigue Scales, higher scores indicate greater daytime sleepiness or fatigue.

Section 2 outlines the statistical methods used in the analysis. The results are reported in Section 3 and some discussion is given in Section 4.

## 2 Statistical Methods

The relationships between whether or not a patient had SOREMs and his/her response to the Sleepiness and Fatigue Scales were examined using chi-square tests of independence. A significant result indicates that a relationship exists between response to the scale and SOREM status. Since the statistical test requires large sample sizes in each category, the highest levels of sleepiness and fatigue (6 and 7) were combined in the analysis.

Mean sleep latencies on both the MSLT and MWT were compared between the SOREM and no SOREM groups using  $t$ -tests, with the assumption that the variability was the same in both groups. Mean sleep latency was only available for patients who fell asleep during at least one session during the test, so all patients who did not fall asleep in any session were not included in this analysis. For any sessions during which a patient did not fall asleep, a latency of 30 minutes was used in the calculation of the mean.

## 3 Results

Comparing responses to the Sleepiness Scale, more patients in the SOREM group indicated problems with daytime sleepiness than patients in the no SOREM group. There is moderate evidence of a difference in the distribution of responses to the Sleepiness Scale between the groups (chi-square test statistic=11.6,  $df = 5$ ,  $p = 0.04$ ). The most common response for

	Response to Sleepiness Scale						<b>Total</b>
	1	2	3	4	5	6 or 7	
SOREM	24 (11.6%)	33 (15.9%)	64 (30.9%)	32 (15.5%)	33 (15.0%)	21 (10.1%)	<b>207</b>
No SOREM	24 (11.4%)	57 (27.1%)	58 (27.6%)	37 (17.6%)	20 (9.5%)	14 (6.7%)	<b>210</b>

Table 1: Counts (percentages) of responses to the Sleepiness Scale for patients who did and did not experience SOREMs. Higher scores indicate greater daytime sleepiness. Responses were missing for 27 patients.

the SOREM group was 3 while for the no SOREM group the most common responses were 2 and 3 and correspondingly fewer people responded with scores of 5 or higher. See Table 1 and Figure 1 for the distribution of responses.

In contrast, both groups of patients indicated similar levels of fatigue. There is no evidence of a difference in the distribution of responses to the Fatigue Scale between the SOREM and no SOREM groups (chi-square test statistic=4.7,  $df = 5$ ,  $p = 0.5$ ). See Table 2 and Figure 1.

The SOREM group exhibited greater daytime sleepiness during both the MSLT and MWT with more patients falling asleep and, for those patients who did fall asleep, smaller mean sleep latencies. (See Table 3.)

In the SOREM group, 213 patients fell asleep at least once during the MSLT while 57 fell asleep in the no SOREM group. For the subjects who fell asleep, there is strong evidence of a difference in mean sleep latency ( $t = 3.46$ ,  $df = 268$ ,  $p = 0.0006$ ). On average, patients in the SOREM group fell asleep 2.3 minutes sooner than patients in the no SOREM group.

During the MWT, 82 patients fell asleep at least once in the SOREM group while 22 fell asleep in the no SOREM group. For the subjects who fell asleep, there is strong evidence of a difference in mean sleep latency ( $t = 3.02$ ,  $df = 102$ ,  $p = 0.0032$ ). On average, patients in the SOREM group fell asleep 4.8 minutes sooner than patients in the no SOREM group.

## 4 Conclusion and Discussion

There is strong evidence that patients who experienced daytime SOREMs also experienced greater daytime sleepiness when considering both the responses to the Sleepiness Scale and the mean sleep latency for patients who fell asleep during the MSLT and MWT.

Since measurements were only recorded on sleep clinic patients, the results can not be generalized to the general population.

It should also be noted that mean sleep latency was calculated as the mean over the four sessions for each test. For sessions in which subjects did not fall asleep, the mean latency

	Response to Fatigue Scale						Total
	1	2	3	4	5	6 or 7	
SOREM	17 (8.1%)	37 (17.6%)	38 (18.1%)	37 (17.6%)	28 (13.3%)	53 (25.2%)	<b>210</b>
No SOREM	19 (9.0%)	38 (17.9%)	53 (25.0%)	36 (17.0%)	19 (9.0%)	47 (22.2%)	<b>212</b>

Table 2: Counts (percentages) of responses to the Fatigue Scale for patients who did and did not experience SOREMs. Higher scores indicate greater fatigue. Responses were missing for 22 patients.

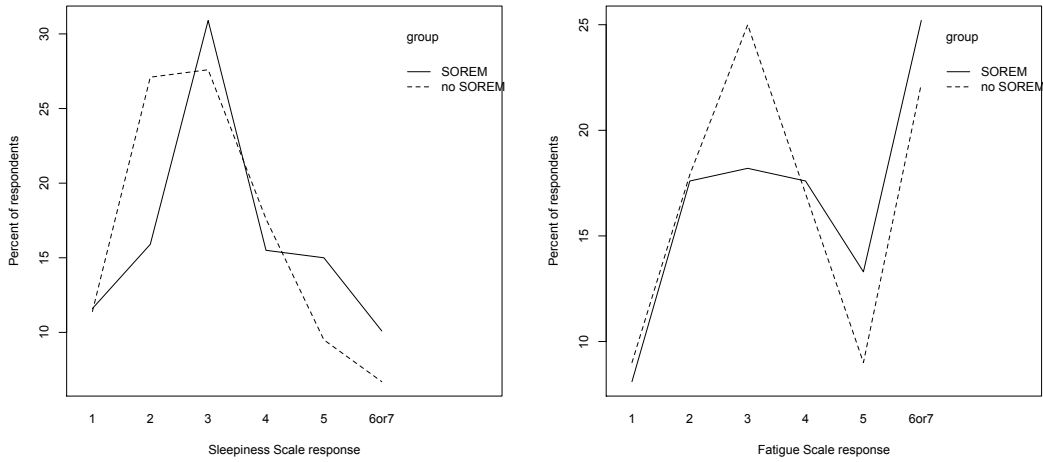


Figure 1: Percentage of respondents within each SOREM group to the Sleepiness Scale and to the Fatigue Scale. The differences in the distributions of responses between the SOREM groups is significant for the Sleepiness Scale but not for the Fatigue Scale.

	MSLT		MWT	
	SOREM	no SOREM	SOREM	no SOREM
Number who fell asleep (Percent of patients)	213 (96%)	57 (26%)	82 (37%)	22 (10%)
Mean sleep latency in minutes (95% CI for the mean)	7.6 (7.0 to 8.2)	9.9 (8.8 to 11.0)	17.2 (15.7 to 18.7)	22.0 (19.8 to 24.2)

Table 3: Mean sleep latency on the MSLT and MWT. Only patients who fell asleep during at least one session of a test are included in the calculations for that test.

was calculated using the session time of 30 minutes. Because we were only given the mean latency and not the latency for each session, we could not appropriately account for the fact that the times were censored at 30 minutes. If it was possible to take into account the true time to fall asleep, greater differences among the groups would be seen since more patients fell asleep in the SOREM group than in the no SOREM group. A more complete analysis would also consider the number of sessions in which each patient fell asleep during the MSLT and MWT.