Sleepiness, Fatigue, Tiredness, and Lack of Energy in Obstructive Sleep Apnea*

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Study objectives: Sleepiness is a key symptom in obstructive sleep apnea syndrome (OSAS) and can be objectively assessed with a multiple sleep latency test (MSLT). We studied the terms that patients prefer to describe their symptoms—sleepiness, fatigue, tiredness, or lack of energy—and how these terms relate to objective findings.

Design: Observational.

Setting: University-based sleep laboratory.

Patients: Consecutive OSAS patients referred for diagnostic polysomnography and an MSLT.

Methods: Data were obtained from sleep studies and questionnaires.

Results: Subjects included 117 men and 73 women, with a mean (± SD) age of 49 ± 13 years, an apnea and hypopnea rate of 32 ± 28/h of sleep, and an MSLT mean sleep latency of 7 ± 5 min. Subjects more frequently reported problems with fatigue, tiredness, and lack of energy than sleepiness (57%, 61%, and 62% vs 47%). When required to select the one most significant symptom, more patients chose lack of energy (about 40%) than any other problem, including sleepiness (about 22%). Objective measures of sleepiness and apnea severity showed little or no association with any symptom, but female gender showed significant associations with each.

Conclusions: Complaints of fatigue, tiredness, or lack of energy may be as important as that of sleepiness to OSAS patients, among whom women appear to have all such complaints more frequently than men. The diagnosis of OSAS should not be excluded based only on a person’s tendency to emphasize fatigue, tiredness, or lack of energy more than sleepiness.

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Key words: fatigue; lack of energy; multiple sleep latency test; obstructive sleep apnea; polysomnography; sleepiness; symptoms; tiredness

Abbreviations: AHI = apnea/hypopnea index; CI = confidence interval; MSL = mean sleep latency; MSLT = multiple sleep latency test; OR = odds ratio; OSAS = obstructive sleep apnea syndrome

The complaint of excessive daytime sleepiness is well established as an important clue to the presence of a range of sleep disorders, among which the most common to reach medical evaluation is obstructive sleep apnea syndrome (OSAS). The International Classification of Sleep Disorders lists the complaint of sleepiness or insomnia as part of the minimal criteria required to make a diagnosis of OSAS. OSAS has recently gained recognition as an important public health problem, in part because of a large population-based study that showed that apneic events occurred at a potentially significant rate during sleep in 24% of adult men and 9% of adult women; the frequency of OSAS was reported as 4% and 2% for the respective genders because only a fraction of persons in each group complained of excessive daytime sleepiness.²

In clinical practice, to help assess the impact of OSAS and measure sleepiness, sleep laboratories can administer an objective test, often considered to be a “gold standard,” the multiple sleep latency test (MSLT)—in which a short mean sleep latency (MSL) on a series of nap attempts suggests excessive daytime sleepiness.³,⁴ Less costly methods are also commonly used, perhaps none more often than the Epworth sleepiness scale, an eight-item questionnaire that asks the patient to rate on a Likert scale the likelihood that he or she would doze in a variety of sedentary situations.⁵

Although an emphasis on sleepiness as a feature of OSAS has undoubtedly facilitated identification of some patients with this disorder, OSAS remains

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undiagnosed in at least 80% of affected men and 90% of affected women.\(^6\) We hypothesized that one potential impediment to diagnosis might also be emphasis on sleepiness, which could discourage further evaluation in patients who express their chief complaint with different terms, in particular, \textit{fatigue}, \textit{tiredness}, or \textit{lack of energy}. Little previous work has investigated what words patients with sleep apnea choose to describe their symptoms, what variables might influence these choices, or what relationships may exist between words that are chosen and objective laboratory measures. We used data from questionnaires, nocturnal polysomnograms, MSLTs, and Epworth sleepiness scales administered in a relatively large clinical sample to examine what words patients prefer in describing their complaints, and to assess the extent to which these words are predicted by objective measures of pathology.

**Materials and Methods**

**Subjects**

We used a sleep laboratory database to identify all subjects who met the following criteria: (1) baseline diagnostic full-night polysomnography, performed between April 1, 1997, and August 10, 1998, that demonstrated obstructive sleep apnea as defined by an apnea/hypopnea index (AHI; the number of apneas and hypopneas per hour of sleep) \(\geq 5\); (2) age \(\geq 18\) years; (3) a questionnaire that included items on sleepiness and related symptoms (described below) was completed at the time of polysomnography or within the prior 4 months; (4) an MSLT was performed because sleepiness was suspected on clinical grounds \(\text{i.e.}, \text{not on the basis of any more specific screening test, criterion, or questionnaire}\); and (5) the Epworth sleepiness scale was completed at the time of laboratory testing. Patients who also had narcolepsy \((n=2)\) in addition to sleep apnea were excluded to avoid confounding from severe daytime sleepiness, but patients with any other comorbid diagnoses were retained because to exclude them would have created a highly selected patient sample and hindered generalization of results to other settings.

The inclusion criterion of more than or equal to five apneas or hypopneas per hour of sleep is among the most commonly used to identify obstructive sleep apnea, but alternative thresholds could have been 10 events/h or even 15 events/h.\(^2\) The lower threshold provides a sample with a range of values that is wider and more useful in tests of association with other variables. Furthermore, consensus guidelines recently published recommended an even less stringent criterion, in which the 5 events/h can include episodes of increased upper airway resistance with arousals but no apnea or hypopnea.\(^7\) However, to check whether our results would change appreciably with a more conservative criterion, we also examined data from the subset of subjects who had an AHI \(\geq 15\).

**Procedures and Measures**

Nocturnal polysomnography included four EEG leads (C3-A2, C4-A1, O1-A2, O2-A1 of the 10–20 international EEG electrode placement system); two electro-oculographic leads (right and left outer canthi); chin and bilateral anterior tibial surface electromyograms; two ECG leads; nasal and oral airflow (thermistors); thoracic and abdominal excursion (piezoelectric strain gauges); and finger pulse oximetry. Digital data were acquired and stored electronically (DEEG/TWIN; Telefactor; Condolhocken, PA). Sleep stages were scored in 30-s epochs in accordance with standard criteria\(^8\) by technologists who, after an extensive training program, had correctly scored at least 90% of epochs in a set of reliability records. An apnea was defined as \(\geq 10\) s of complete airflow cessation during sleep. An hypopnea was defined as a reduction in airflow, chest excursion, or abdominal excursion that led to a \(\geq 4\%\) oxyhemoglobin desaturation, an arousal, or an awakening. Minimum oxygen saturation for each study was defined as the lowest artifact-free level recorded during sleep.

The MSLTs followed standard methods for collection of EEG, electro-oculogram, and chin electromyogram data.\(^3\) Each patient's MSL was calculated as the time, averaged across all nap attempts, from "lights out" to the first epoch of stage 1 sleep. On the night before the MSLT, patients also completed the Epworth sleepiness scale.\(^3\)

As part of a questionnaire administered to each sleep laboratory patient for clinical purposes, the items listed in Table 1 asked which terms best represented the patient's problem. The author developed these question-items in 1996 and assessed content validity by obtaining opinions of three other academic sleep specialists. Simple parallel wording maximizes face validity for comparisons of how patients use particular terms.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item Topic</th>
<th>Unambiguous Responses, No.</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Sleepiness is a problem for me.</td>
<td>188</td>
</tr>
<tr>
<td>2</td>
<td>Fatigue is a problem for me.</td>
<td>188</td>
</tr>
<tr>
<td>3</td>
<td>Tiredness is a problem for me.</td>
<td>189</td>
</tr>
<tr>
<td>4</td>
<td>Lack of energy is a problem for me.</td>
<td>190</td>
</tr>
<tr>
<td>5</td>
<td>Which most affects your ability to accomplish what you want?</td>
<td>177</td>
</tr>
<tr>
<td>6</td>
<td>Which is the worst problem for you?</td>
<td>172</td>
</tr>
<tr>
<td>7</td>
<td>If you could be cured completely of only one of these problems, which would you choose?</td>
<td>173</td>
</tr>
</tbody>
</table>

*For items 1–4, answers were provided on a 5-point Likert scale: 1=never, 2=seldom, 3=occasionally, 4=often, 5=almost always. For the last three items, one of four choices could be chosen: (1) sleepiness, (2) fatigue, (3) lack of energy, (4) tiredness. All four choices were self-defined; no supplementary definition was provided.
Statistical Analysis

Results were summarized as mean ± SD or as frequencies. Differences in frequencies were assessed with χ² tests. We used the nonparametric Wilcoxon rank sum test to compare ordinal responses and nonnormally distributed continuous variables between men and women. We used logistic regression to test for associations between the main outcome variables (terms used to describe patients’ problems) and explanatory variables (objective polysomnographic and MSLT measures, Epworth sleepiness scale, age, and gender). To reduce outcome data to binary variables for logistic regression analysis, responses of often or almost always to items 1 to 4 in Table 1 were coded as 1, and other responses were coded as 0. Patient ratings for each complaint were also combined and tested as aggregate measures in two ways: individual complaint scores were averaged to obtain a mean complaint score, and the maximum Likert-scale response to the four complaint terms was taken as the maximum complaint score. For logistic regression models, patients with mean complaint scores ≥ 4 (often) were compared to remaining patients. Patients with maximum complaint scores of 5 (almost always) were also compared to remaining patients.

Data were analyzed with computer software (SAS version 6.12; SAS Institute; Cary, NC). Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated with the profile-likelihood method. In statistical tests, the significance level was set at 0.05.

RESULTS

Overview

A total of 190 subjects met all inclusion criteria. Nearly all provided unambiguous answers to question items 1, 2, 3, and 4 (Table 1), and > 90% did so for question items 5, 6, and 7. The mean age of the subjects was 48.6 ± 13.1 years, and 117 subjects (62%) were men. Table 2 summarizes results of main outcome and explanatory measures for the entire group and each gender. On average, patients rated the frequency with which they suffer from sleepiness, fatigue, tiredness, and lack of energy as between occasionally and often, but 138 patients (73%) had at least one of these symptoms often or almost always, and 71 patients (37%) had a problem with at least one symptom almost always. Compared to women, men described less frequent problems with each of these conditions; the difference for sleepiness was the smallest and only attained marginal significance.

The mean total recording time during polysomnography was 476 ± 22 min, and the mean total sleep time was 372 ± 63 min. The average patient showed objective evidence of excessive daytime sleepiness, with a MSL (Table 2) within the range reported in disorders that cause excessive daytime sleepiness. The average patient had an abnormally high score (i.e., > 10) on the Epworth sleepiness scale and a moderate level of obstructive sleep apnea. Men showed somewhat more frequent apneic events than women, but scored lower on the Epworth sleepiness scale.

Frequency of Primary Complaints

Fatigue, tiredness, and lack of energy were each reported to be a problem often or almost always by more of the patients (57%, 61%, and 62%, respectively) than was sleepiness (47%). Responses to question-items 5, 6, and 7 (Table 1), which in three different ways required patients to express which of the four possible complaints was most significant for them, showed that patients most often considered

<table>
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<tr>
<th>Table 2—Summary Measures for Outcome and Explanatory Variables*</th>
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<tbody>
<tr>
<td>Variables</td>
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<td>-----------</td>
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<tr>
<td>Outcome variables‡</td>
</tr>
<tr>
<td>Sleepiness</td>
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<tr>
<td>Fatigue</td>
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<tr>
<td>Tiredness</td>
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<tr>
<td>Lack of energy</td>
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<tr>
<td>Mean complaint score</td>
</tr>
<tr>
<td>Maximum complaint score</td>
</tr>
<tr>
<td>Explanatory variables</td>
</tr>
<tr>
<td>MSL, min</td>
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<tr>
<td>Epworth sleepiness scale</td>
</tr>
<tr>
<td>AHI</td>
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<tr>
<td>Minimum oxygen saturation, %</td>
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<tr>
<td>Age, yr</td>
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</tbody>
</table>

*Data are presented as mean (SD).
†Wilcoxon rank sum test for difference between men and women.
‡Values shown are means for Likert scale responses, which were reported on a scale of 1 through 5, as indicated in Table 1.
lack of energy to be the major problem they faced (p < 0.01 in each of three χ² tests for equal frequencies of complaints; Fig 1). Specifically, 44% of patients said that lack of energy most affected their ability to accomplish what they wanted, 36% considered lack of energy to be their worst problem, and 36% said this problem was the one that they were most eager to have cured. In comparison, only 16% of patients said sleepiness was their most limiting symptom, 25% said sleepiness was their worst problem, and 27% said that sleepiness was the one problem that they were most eager to have cured. When required to indicate one primary symptom from the four given choices, men and women showed little difference in the frequencies with which they selected individual terms (Fig 2).

To characterize patients with more extreme differences between their reports of sleepiness and reports of other problems, we used data from the 52 patients who indicated that sleepiness was never (n = 25) or seldom (n = 27) a problem. Among these 52 patients without symptomatic sleepiness, the number of patients who reported that they had fatigue, tiredness, or lack of energy either often or almost always was 14 patients (27%), 14 patients (27%), and 17 patients (33%), respectively. The number with one or more of these three complaints often or almost always was 19 patients (37%). The mean AHI among the 52 patients without symptomatic sleepiness was 31.1 ± 22.0, the minimum oxygen saturation was 83.7 ± 8.5%, the MSL was 8.9 ± 5.2 min, and 35 patients (67%) were men.

Variables That Predicted Complaints

Table 3 shows the results of simple logistic regression models in which the outcome was presence or absence of the indicated complaint—as assessed by dichotomized responses to question-items 1, 2, 3, and 4—and the explanatory variable was that listed in the first column. Each cell shows the OR, along with its 95% CI, for the presence of the indicated complaint and an increase or decrease in the explanatory variable by about 1 SD. For simplicity, nonsignificant ORs (p ≥ 0.05) are left blank. As can be seen in the first row, MSL showed no statistically significant association with any of the four complaints. In analogous models shown in the second row, the Epworth score was significantly associated with sleepiness, tiredness, and lack of energy, but not fatigue. Patients with higher AHIs were no more likely to report frequent sleepiness or lack of energy, but they were marginally less likely to report frequent fatigue and tiredness. Minimum oxygen saturation showed no association with complaints, and age also showed none, except for a marginal association between younger age and frequency of sleepiness. Female gender was associated with a markedly increased frequency of each complaint.

Independent associations between each complaint as the outcome and MSL, Epworth score, AHI, minimum oxygen saturation, age, and gender as explanatory variables were tested with multiple logistic regressions that included all the explanatory variables as covariates, except for the Epworth score (because adjustment for a variable that is highly subjective, like the outcomes, would not have been
useful). The MSL and the Epworth score showed no independent associations with complaints, with only one exception: the Epworth score was associated with more frequent sleepiness (OR, 2.4; 95% CI, 1.7 to 3.5). The AHI, minimum oxygen saturation, and age showed no independent associations with any complaint, except that the AHI was marginally and inversely associated with fatigue (OR, 0.6; 95% CI, 0.4 to 0.9). In contrast, female gender was independently associated with increased sleepiness (OR, 2.1; 95% CI, 1.2 to 3.9), fatigue (OR, 2.8; 95% CI, 1.5 to 5.3), tiredness (OR, 3.4; 95% CI, 1.8 to 6.7), and lack of energy (OR, 4.1; 95% CI, 2.1 to 8.5).

To determine whether women complained of these problems more frequently than men because women perceived their sleepiness better than men, we tested the association of each of the four complaints with the interaction between female gender and MSL. None of the interaction terms reached statistical significance; levels of objective sleepiness were not more strongly associated with levels of complaint among women than among men.

### Aggregate Measures of Complaints

The mean complaint scores and maximum complaint scores, dichotomized as described in the Methods section to represent presence or absence of symptoms, generally did not show stronger associations with explanatory variables than did individual complaints (Table 3, last two columns). In particular, MSL failed to show a statistically significant association with either mean or maximum complaint scores (OR, 1.0; 95% CI, 0.7 to 1.4 for each, not shown in Table 3), as did the AHI and the minimum oxygen saturation.

### Alternative Criterion for Obstructive Sleep Apnea

When the analyses were limited to the subset of subjects with AHI $\geq 15$ (n = 125; mean age, 46.5 ± 12.3 years; male subjects, 66%), the relative frequencies of the four complaints remained unchanged: fatigue, tiredness, and lack of energy were still each reported to be a problem often or almost always by more of the patients (53%, 57%, and 59%, respectively) than was sleepiness (42%). Furthermore, the four complaints were each selected as most significant (most limiting accomplishments, constituting the worst problem, and most important to eliminate) with frequencies that were nearly identical to those displayed by the entire sample (Fig 1). Within the subgroup, relative strengths of association between each of the four complaints and the independent variables listed in first column of Table 3 remained unaltered, and no tested association that failed to reach significance in the overall sample attained significance in the subgroup analysis.

### Discussion

This study demonstrates that even when sleepiness is suspected for clinical reasons, OSAS patients may choose different words—in particular, fatigue, tiredness, or lack of energy—to describe their problem. We found that the proportion of patients who preferred the term sleepiness to describe their primary problem was only about 22%, while about 40% preferred lack of energy, 18% preferred fatigue, and 20% preferred tiredness. Furthermore, the level of each complaint generally showed no association with objective, “gold-standard” polysomnographic mea-

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**Table 3—Simple Logistic Regression Models of Patient Complaints on Several Tested Variables**

<table>
<thead>
<tr>
<th>Tested Variables</th>
<th>Change Tested†</th>
<th>Sleepiness</th>
<th>Fatigue</th>
<th>Tiredness</th>
<th>Lack of Energy</th>
<th>Mean Complaint Score</th>
<th>Maximum Complaint Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSL</td>
<td>5-min decrease</td>
<td>2.5 (1.8–3.6)</td>
<td></td>
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<tr>
<td>Epworth sleepiness scale</td>
<td>5-point increase</td>
<td>1.5 (1.1–2.1)</td>
<td>1.4 (1.0–1.9)</td>
<td>1.9 (1.4–2.6)</td>
<td>1.5 (1.1–2.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AHI</td>
<td>30-point increase</td>
<td>0.7 (0.5–1.0)</td>
<td>0.7 (0.5–0.9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum oxygen saturation</td>
<td>10%-point decrease</td>
<td>1.3 (1.0–1.6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.3 (1.1–1.7)</td>
</tr>
<tr>
<td>Age</td>
<td>10-yr decrease</td>
<td>2.1 (1.2–3.9)</td>
<td>2.8 (1.5–5.3)</td>
<td>3.4 (1.8–6.7)</td>
<td>4.1 (2.1–8.5)</td>
<td>2.4 (1.3–4.4)</td>
<td>2.5 (1.4–4.6)</td>
</tr>
<tr>
<td>Gender</td>
<td>From male to female</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

*Values are given an OR (95% CI). Only statistically significant (p < 0.05) ORs are shown.
†For all variables except gender, approximates 1 SD.
The lack of statistically significant associations between objective measures of OSAS severity and levels of subjective fatigue, tiredness, and lack of energy may not be surprising, but the absence of an association with subjective sleepiness is more difficult to explain. However, we have also made the latter observation in the past among other OSAS patients. In contrast to objective measures of sleepiness, the current Epworth sleepiness scale scores were associated with complaints (at least before adjustment for other variables), consistent with previous findings for the complaint of sleepiness. The lack of a substantial correlation between the Epworth scale and MSLT results, as implied by our current findings, is consistent with recent results of the largest series yet to explore this relationship among patients evaluated for OSAS.

Discrepancies between objective measures of OSAS and subjective complaints raise the possibility that the objective measures are to some extent incomplete or inadequate. However, the AHI and mean oxygen saturation recorded during polysomnography have proved to be sensitive correlates of risk factors for OSAS, such as obesity, and of possible consequences such as hypertension and cognitive deficits. Similarly, the MSLT MSL has been shown to correlate with previous sleep deprivation and with the presence of disorders known to cause excessive sleepiness, although the few studies of MSLT results in relation to expected long-term outcomes, such as motor vehicle accidents, have not shown a clear association.

Rather than a deficiency of standard objective measures, a more likely explanation for the absence of associations with patient complaints is that the daytime subjective consequences of obstructive sleep apnea are more complicated and less precise than “physiologic sleep tendency” measured by an MSLT. Patients appear to use the complaints we studied in ways that should not be prejudged to carry diagnostic significance. We did not study excessive sleepiness as determined by detailed inquiry into sedentary activities, sleep schedules, and functional limitations; clinicians who diligently pose these questions in an effort to separate “true” sleepiness from fatigue, tiredness, or lack of energy may find more benefit than we could show with a simple questionnaire. However, some such clinicians may also miss the point that any of these problems, all of which are important to patients, can stem from the same chronic sleep disorder. Questions recommended in some texts as useful in identification of true sleepiness often resemble those included in the Epworth scale, which among our patients showed no better association with objective measures of sleepiness than did patient complaints. We speculate that neurophysiologic changes that result from disrupted sleep may well include more than one possible manifestation.

In contrast to objective measures of apnea severity, male gender showed strong associations with lower levels of complaints. Compared to women, men often have more severe sleep apnea, indistinguishable MSLs on MSLTs, and less subjective sleepiness as measured by the Epworth sleepiness scale. The current findings suggest that the gender discrepancy in symptom reports is even more pronounced for fatigue, tiredness, and lack of energy than for sleepiness. One potential explanation—a less accurate perception of physiologic sleepiness among men—was not supported by our finding that gender had no influence on the degree of association between subjective sleepiness and MSL. We suspect that cultural influences may make men less willing than women to admit that they have any of the problems we asked about. In support of this alternative explanation, when our male patients were required to select the one most applicable symptom, they chose specific terms in relative frequencies that were nearly identical to those produced by women. Finally, our findings also could be consistent with an as yet undiscovered, gender-based neurophysiologic bias in the way that daytime effects of disturbed sleep are perceived.

To our knowledge, the present study is the first to directly compare patients’ preferences for terms that describe their main problem in untreated OSAS. Early reports suggested that sleepiness stems from nocturnal sleep deprivation or disruption seen in OSAS, and many investigators originally referred to the syndrome as the hypersomnia sleep apnea syndrome. Although the MSLT was developed and validated primarily with experimental sleep deprivation paradigms, the test was soon applied to the evaluation of OSAS patients, and widespread clinical use may have helped foster the idea that “sleepiness” was the relevant daytime complaint if any was to be found. The current edition of the International Classification of Sleep Disorders contains a description of OSAS, suggests criteria for its diagnosis, and reviews associated symptoms from loss of libido to morning headaches, but the entry does not mention “fatigue,” “tiredness,” or “lack of energy.”

A common lesson in medical education is that a complaint of excessive sleepiness raises the possibility of a sleep disorder, while complaints of fatigue, tiredness, or lack of energy tend to suggest other
psychiatric and medical diagnoses, for example depression and hypothyroidism. Widely used medical textbooks may not give a differential diagnosis for fatigue; those that do, often omit OSAS. Although our study did not explore complaints among patients with conditions other than OSAS, our findings and the known high prevalence of undiagnosed obstructive sleep apnea suggest that the often-taught diagnostic dichotomy between sleepiness and other complaints may obscure appropriate diagnoses in a substantial number of patients. Some previous studies of chronic fatigue syndrome have suggested that sizable numbers of patients with this diagnosis have occult sleep disorders such as OSAS. Among our patients who denied having more than seldom problems with sleepiness, more than a third reported that problems with fatigue, tiredness, or sleepiness occurred often or almost always.

In conclusion, our finding that fatigue, tiredness, or lack of energy was the complaint that most concerned three fourths or more of our OSAS patients has several important implications for education, clinical work, and research. These symptoms merit some discussion in OSAS descriptions and diagnostic criteria. Clinicians who do not realize that OSAS patients sometimes express their problem in words other than sleepiness may miss a diagnosis believed to have important effects on quality of life, cardiovascular health, and mortality. Research studies on OSAS should not necessarily exclude patients who complain of fatigue, tiredness, or lack of energy instead of sleepiness. Population-based studies of OSAS in the past may have significantly underestimated its prevalence because case ascertainment required a complaint of sleepiness. Future studies of OSAS should include assessment of complaints such as fatigue, tiredness, and lack of energy in addition to sleepiness. In particular, further study will be needed to confirm that complaints other than sleepiness also improve with treatment for OSAS.

REFERENCES

8 Rechtschaffen A, Kales A. A manual of standardized terminology, techniques and scoring system for sleep stages of human subjects. Los Angeles, CA: Brain Information Service/Brain Research Institute, UCLA, 1968; 1–12
12 Chervin RD, Aldrich MS. The Epworth sleepiness scale may not reflect objective measures of sleepiness or sleep apnea. Neurology 1999; 52:125–131
18 Carskadon MA, Dement WC. Sleep loss in elderly volunteers. Sleep 1985; 8:207–221
19 Carskadon MA, Dement WC. Cumulative effects of sleep restriction on daytime sleepiness. Psychophysiology 1981; 18:107–113
20 Carskadon MA, Dement WC. Effects of total sleep loss on sleep tendency. Percept Mot Skills 1979; 48:495–506
29 Adams RD, Victor M, Ropper AH. Fatigue, asthenia, anxiety,