Erectile Dysfunction and Symptoms of Sleep Disorders

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Study Objectives: Sleep apnea often is associated with impotence and/or erectile dysfunction (ED). The purpose of this study was to test whether a presentation for ED confers a pretest probability for obstructive sleep apnea hypopnea syndrome (OSAHS).

Design: A self-report survey for sleep complaints was conducted in consecutive male patients (>16 years of age) presenting to a urologic practice site.

Setting: The survey was provided to new and follow-up out-patients over a 2-month period of time. Other information collected included the presenting complaint, the clinical diagnosis for ED, and history of preexisting medical conditions.

Participants: N/A

Interventions: N/A

Measurements and Results: 285 males (91% of the sample: 50 years old [range 16-82] and body mass index, 27.3 [range 16.8-52.5]) completed the survey. 181 (63%) had complaints of ED; of those, 76% had a final diagnosis of organic and 8.2%, psychogenic or both psychogenic and organic ED. Of all respondents, 35.4% reported persistent snoring, 14% reported persistent wake-time sleepiness or fatigue, and 26.8% were at “high risk” (Netzer et al., 1999) for OSAHS. Some were high risk for insomnia (13.6%) and restless legs syndrome or for narcolepsy (2% each). There was a correlation between those with ED complaints (p<0.014) or those with a final diagnosis of organic ED (p<0.029) and snoring. In a logistic model that included age, snoring, and preexisting conditions, only age, depression, and history of hypercholesterolemia, were found to vary significantly among those with and without ED.

Conclusions: Urology patients will report a variety of sleep problems, but neither persistent snoring nor suspected OSAHS is correlated uniquely to ED.

Key words: Sleep disorders; sleep apnea; impotence; patient questionnaire.

INTRODUCTION

THREE LINES OF PUBLISHED WORK SUGGEST AN ASSOCIATION BETWEEN IMPOTENCE OR ERECTILE DYSFUNCTION (ED) AND SLEEP APNEA. First, there are collections of patients in which reports of impotence are found to be present at the time of diagnosis of sleep apnea;1,2 one study reported that symptoms of impotence are improved in 40% of patients after treatment of sleep apnea;3 and another reported an association of impotence in obstructive sleep apnea (OSA) with occult nerve dysfunction in OSA.4 Moreover, expert review articles suggest that this association of sleep apnea and ED regularly occurs.5,6 Therefore, it is reasonable to suspect that some patients experience ED secondary to sleep apnea and that identification of such patients might be important. The second group of observations reports that respiratory events (apneas or apneas and hypopneas) as well as periodic leg movements are incidentally found in polysomnographic nocturnal penile tumescence studies for impotence.7,12 One report,13 however, discounts the association. Third, a number of epidemiologic surveys suggest associations among snoring, sleep apnea, and cardiovascular diseases of hypertension, stroke, and ischemic heart disease.14-16 Cardiovascular risk factors are often found in association with complaints of ED,17,18 so it may be that symptoms and signs of sleep apnea are enriched in a patient population presenting for assessment of ED.

The purpose of this survey was to determine the range of sleep complaints present in a urologic practice and test the hypothesis that ED is associated with a high pretest probability (“high risk”) of obstructive sleep apnea hypopnea syndrome (OSAHS).19,20 We sought correlations among “high risk” OSAHS symptoms to presenting ED complaints and the final diagnostic category of ED, comparing results to those presenting to the same practice but without ED symptoms. We used a short self-report questionnaire to determine if patients presenting with complaints of ED also will report snoring behavior and wake-time sleepiness and the presence of obesity and hypertension, putting them at high risk for OSAHS and thus triggering a diagnosis or treatment referral.20 The questionnaire also probed about other persistent sleep problems related to sleep onset and quality, nocturnal leg movements, and cataplexy like reports, behaviors that might lead a physician to consider a referral for sleep disorders like insomnia, restless legs syndrome, and narcolepsy. Finally, the goal was to survey all patients presenting for urologic consultation, so as to determine whether self-reported sleep problems were isolated to ED, or merely a feature of the referral population.

METHODS

The design of the study was approved by the Human Subjects Committee, University Hospitals of Cleveland, Cleveland, Ohio. Surveys were provided to one urologic surgeon (ADS) who identified staff to hand out the instrument to consecutive patients for any office visit over a 2-month period of time. The staff was instructed to return the papers to the sleep center. For a questionnaire to be considered valid, it had to meet the following criteria: a date on the questionnaire within a 2-month time period and return of the questionnaires within a month of the last visit. Questionnaires meeting these criteria were submitted for analysis.

At a separate time and without knowledge of the sleep survey results, patient charts were abstracted for the following data: presenting complaint, final diagnosis of ED, and presence or absence of a medical diagnosis of the following conditions: back pain, depression, heart disease, stroke, diabetes, high cholesterol, and depression or mood disorders. The diagnosis of ED, organic versus psychogenic, was based on the disease history and physical examination.21 Patients completed a brief depression inventory22 at the office visit. A Center for Epidemiologic Studies Depression Scale score of > 16 was consistent with clini-
from self-reported weight and height, expressed as kg/m². The determi-
hop of finding increased apneic activity on a sleep study is known.20 The Berlin Questionnaire addresses three known risk factors
for sleep apnea: snoring history (5 questions); tiredness (4 questions); and history of high blood pressure and/or body mass index (BMI)>30.

Patients were asked to provide information concerning their age, weight, height, gender, and race. Obesity was quantified by BMI, as calculated from self-reported weight and height, expressed as kg/m². The determination of a “high risk” and “lower risk” pre-test probability was based on the chronicity and severity of several reported symptoms and traits. There were three items, called categories, considered: snoring, daytime sleepiness or fatigue, and BMI>30/high blood pressure. To be “high risk,” a person would have reported persistent (“>3-4 times/week” or “every day”) symptoms in two questions or more about their snoring (Category 1) and persistent symptoms in two questions about wake-time sleepiness and drowsy driving (Category 2), or persistent symptoms resulting in a positive Category 1 or Category 2 and at least one feature (history of high blood pressure or BMI>31) in Category 3. In other words, a questionnaire had to have 2 of the 3 categories positive to be considered as indicating a high risk for OSAHS.20 Respondents who denied chronic symptoms or had chronic symptoms or signs in only one category were placed in the “lower-risk” group.

Additional questions probed for persistent symptoms of insomnia (3 questions, including 1 about the use of drugs or alcohol to promote sleep); use of medications to treat hypertension (1 question); smoking history (1 question); leg jerks during sleep (1 question); strange sensations in the legs (1 question); and drop attacks or sudden weakness with surprise, anger, or laughter (1 question). The scoring for these questions in regard to high risk was based upon persistent presence of these problems by the patient having checked off “>3-4 days a week” or “every day (night).” High risk for insomnia was based upon persistent symptoms in two of the three questions; high risk for restless legs syndrome was based upon persistent report of both leg jerks during sleep and leg sensations; and high risk for narcolepsy was based upon persistent report of drop attacks and a positive score in Category 2 (sleepiness). In summary, the questionnaire is a pretest or preexamination probability tool for four potential clinical disorders of sleep—OSAHS, insomnia, restless legs syndrome, or narcolepsy—and a patient could be deemed high risk for one or more sleep disorders.

Data Entry and Statistical Evaluations

Two hundred ninety nine (93%) questionnaires were returned from a potential 320 unique encounters; 289 met criteria for timeliness and completeness of clinical data and were entered for analysis. Two respondents (2/291 or 0.7%) reported that they had been diagnosed with OSAH, and one with hypogonadism the other with organic impotence; both were untreated and remained in the analysis. Four respondents were women, and thus the sample to be reported consisted of 285 males (91% of the sample). Respondents provided information on race (69% white; 23% black; 3% other).

The quantitative distribution of returned questionnaires, individual patient parameters, answers in single questions according to sleep-related symptoms, and grouping according to high probability of a sleep disorder is expressed by descriptive statistics (frequencies, mean, SD, and range). Missing data and not applicable data are expressed in the percentage of the returned questionnaires and in total number for each parameter.

In addition to descriptives statistics, in some models the ED groups were categorized. These mutually exclusive groups were compared in terms of age and BMI and preexisting medical conditions using analyses of variance for continuous variables and chi-square tests for categorical variables. Multinomial logistic regression was used to determine which variables were independently associated with the group. Age and other independent variables identified as significantly associated with groups in the ED membership analyses were then included in the regression model. Descriptive statistics and models of analysis were developed using SPSS 10.0 for Windows (SPSS, Inc., Chicago, Illinois).

RESULTS

Figure 1 displays the flow of analysis and the age and BMI of each group. The mean age of the clinic population was 50 years (age range, 16-82 years). Erectile dysfunction as a major presenting complaint was present in 179 (63%; age range, 16-81); the remainder (n=106; 37%; age range, 21-82) presented with variety of anatomic or other functional urologic problems or disorders. There were 166 (58% of the sample) with an end-of-visit (final) diagnosis of ED; 49% of the entire dataset had a final diagnosis of ED of organic cause. In 12 patient charts there was insufficient data to determine the final diagnosis for the presenting complaint of ED, and these cases were not further analyzed nor included in Figure 1. There were significant differences (p<.001) among ED memberships in age but not in BMI. As expected, there were significant correlations among diagnostic categories of ED and a history of various medical conditions (Table 1).

One hundred sixty seven (57%) of all responders reported that they snored; 86 (30%) denied snoring; 32 (11%) did not know if they snored. Thirty one (18%) of the respondent snorers reported their snoring as louder than normal speech. Ninety two (53%) snorers reported they snored at least 3 to 4 times per week. One hundred twenty (70%) snorers reported that their snoring bothered other people. In 16 (11%) of the snorers, breathing pauses during sleep were observed by others >1 to 2 times per month. Eighty three (29%) responders were positive on a composite risk for reporting persistent snoring (Category 1).

Two hundred four (72%) of all responders stated that they felt rested after a night sleep at least 3 to 4 times per week; the remainder did not. Seventy five (27%) admitted wake-time tiredness or fatigue at least 3 to 4 times per week. Forty six (16%) of respondents to the question about sleepiness at the wheel admitted that they had nodded off or fallen asleep while driving. Three (1%) reported that they nodded off at the wheel at least 3 to 4 times per week and another 6 (2%) reported doing so 1 to 2 times per week. Eighty three (29%) scored positive in the composite risk for reporting persistent wake-time sleepiness or fatigue (Category 2).

The mean BMI was 27.3 kg/m² (SD, 5; range, 17-53). Sixty one (21%) of patients had a BMI>30. Sixty one (21%) reported a history of high blood pressure; 13 (5%) did not know if their blood pressure was high or normal; 14 (5%) did not answer the question. One hundred (35%) scored positive in the composite risk Category 3.

For the entire group, 77 (27%) met criteria for high risk for OSAHS, using the Berlin Questionnaire criteria (20). Using criteria to assess risk for other sleep disorders, there were 39 (13%) for insomnia and 5 each (2%) for narcolepsy and restless legs syndrome, all meeting criteria for high risk. Four patients met high risk criteria for both OSAH and narcolepsy; 4 patients met high risk criteria for both narcolepsy and insomnia; and 4 met high risk criteria for both restless legs syndrome and insomnia. There was 1 patient meeting high risk criteria for both OSAHS and restless legs. In summary, there were 95 (32.1%) patients at high risk for any sleep disorder; of these, there were 9 at risk in 2 categories and 2 at risk in 3 or all 4 sleep disorders, respectively.

Table 2 presents the correlations among presenting symptoms and final diagnostic categories of ED and sleep disorders. There were significant correlations in regard to persistent snoring (Category 1) and ED as a final diagnosis with a more specific correlation to ED of organic cause. For example, 58% of those with organic ED were positive in Category 1, while 40% of those without ED were positive in Category 1.

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While the correlation was significant, the likelihood of having ED if one was positive in Category 1 was low (OR 1.20, CI 0.85-2.4). However, in any ED category there were no significant associations with overall OSAHS risk or Category 2 or Category 3. There were also associations found with ED as a presenting complaint and restless legs syndrome risk and with narcolepsy risk and any ED category, although the number of individuals with these sleep disorders, risk was small, insufficient to be confident of its predictive value.

There were correlations among some of the other self reported sleep complaints and ED categories that reached statistical significance. Those with ED as a presenting complaint were more likely to report going to bed late into the morning hours (28% with the chief complaint of ED vs. 16% for those without ED; p<.019), to report frequent leg sensations at night before going to sleep (10% vs. 4%; p<.018), and to report frequent leg jerking at night (8% vs. 2%; p<.01). Those with ED were less likely to respond positively to the question about falling asleep at the wheel (13% vs. 23%; p<.015). Correlations with responses to other sleep-complaint questions and with final diagnosis of ED were of marginal or no significance due to low reported events.

In multinominal analyses containing age and preexisiting conditions (see Table 1), persistent snoring (Category 1) was no longer correlated with ED groups. Erectile dysfunction as a presenting symptom was correlated with age (p<.001) and depression (p<.01), and ED of organic origin with age (p<.001) and cardiovascular risk and history of hypercholesterolemia (p<.001) in particular.

**DISCUSSION**

Sleep problems and possible sleep disorders were common in this clinical population. A univariate correlation did exist with persistent snoring and ED of organic origin; however, this symptom was no longer correlated when persons were compared after controlling for age and preexisting medical conditions. There was a lower reporting of drowsy driving but a greater prevalence of symptoms suggesting restless legs syndrome (leg sensations and jerks at night) with ED as the presenting complaint; however, the numbers were small. Therefore, the hypothesis that people presenting with ED more often report risk factors for a diagnosis of OSAHS than those without ED is rejected.

The prevalence of those who reported persistent snoring or we found to be at high risk for OSAHS was high in both those without as well as with a complaint of ED, probably reflecting the age and gender of the group and a consequence of the prevalence of OSAHS in clinical populations.20,24 Previous reports showing associations of OSA with impotence did not survey large numbers of patients with ED complaints and, thus, could be confounded by ascertainment bias or occur by chance because too few unselected patients were included in a survey (Type 2 error). Alternatively, there is a sub-group of patients with ED that can be identified by means other than self-report that might benefit from a diagnosis and treatment of sleep apnea.

The use of a simplified instrument and patient-centered approach found a greater number meeting minimal criteria for work-up of OSHAS than what is present in the general population.14 The prevalence of symptoms for sleepiness and for snoring and those at high risk for OSAHS is also higher than that in the general population, comparable to those found in surveys of cardiovascular specialty clinics or internal medicine practices in the Cleveland area.14,20,24 One source for an elevated prevalence could be the presence of multiple potential causes for sleepiness, something that is clearly a possibility in this study. Another is misclassifi-
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**REFERENCES**


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**Table 2. Correlation between erectile dysfunction and risk of sleep disorders**

<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Number (%) with ED as chief complaint</th>
<th>Number (%) with organic ED as a final diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSAHS</td>
<td>52 (28%)</td>
<td>40 (29%)</td>
</tr>
<tr>
<td>Category 1 (snoring)</td>
<td>58 (32%)</td>
<td>49 (35%)</td>
</tr>
<tr>
<td>Category 2 (sleepiness)</td>
<td>55 (30%)</td>
<td>41 (30%)</td>
</tr>
<tr>
<td>Category 3 (BMI&gt;30)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HTN</td>
<td>67 (37%)</td>
<td>54 (39%)</td>
</tr>
<tr>
<td>Insomnia</td>
<td>25 (14%)</td>
<td>21 (15%)</td>
</tr>
<tr>
<td>RLS</td>
<td>5 (3%)</td>
<td>4 (3%)</td>
</tr>
<tr>
<td>Narcolepsy</td>
<td>5 (3%)</td>
<td>5 (4%)</td>
</tr>
</tbody>
</table>

ED, erectile dysfunction; HTN, report of high blood pressure; OSAHS, obstructive sleep apnea hypopnea syndrome; RLS, restless legs syndrome


