Snoring Sound and Sleep Analysis in an Obese Patient Group

Obez Hasta Grubunda Uyku ve Horlama Sesi Analizi

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ABSTRACT

Objectives: Snoring is the most common symptom of obstructive sleep apnea syndrome (OSAS). In this study, snoring percentage and severity were determined in a group of obese patients (with a BMI ≥ 30 kg/m2) and the relationship between OSAS severity and snoring intensity were investigated.

Methods: A total of 60 obese patients were retrospectively included in the study with a complete polysomnography (PSG) examination and snoring sound analysis which was performed simultaneously with the sleep study. The participants were divided into three groups according to AHI scores. The percentages of snoring sounds above 65 and 85 dB, determined during sleep were compared between groups. The demographic data, PSG record and snoring percentage of the patients were compared statistically.

Results: The intensity of snoring sound and the percentages of snoring sound above 65 and 85 dB were found to be significantly related with the disease severity of OSAS in the obese patients (P<0.05).

Conclusion: In this study, the significant relationship between OSAS severity and snoring sounds percentages over 65 and 85 Db in obese patients was demonstrated. These findings are promising for further studies and clinical use.

Key Words: Obesity, OSAS, snoring

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ÖZET

Amaç: Horlama Obstruktif Sleep Apne Sendromu’nda sık görülen bir semptomdur. Bu çalışmada obezitesi olan hasta grubunda (BMI ≥ 30 kg/m2 olan) horlama seviyesi ve horlama oranı tespit edilmiş ve horlama seviye ve oranı ile OSAS seviyesi arasındaki ilişki araştırılmıştır.

Yöntem: Bu çalışmada, total 60 obez hasta prospektif olarak değerlendirildi ve komple Polisomnografik (PSG) ve aynı anda horlama sesi analizi yapıldı. Horlama AHI’ye göre 3 gruba ayrıldı. 65 dB ve 85 dB ve üzeri horlama oranları kayıt edilen hastaların 3 gruba ayrıldığı ve gruplar arası karşılaştırıldı. Hastaların demografik verileri, PSG kayıtları ve horlama oranları istatistiksel olarak karşılaştırıldı.

Bulgular: Obez hastalarında horlama sesinin şiddeti ve 65 dB ve 85 dB lik horlama oranları ile OSAS şiddetini arasında önemli bir ilişki tespit edildi.

Sonuç: Bu çalışmada elde edilen obez obez hasta grubunda horlama sesinin şiddeti, 65 ve 85 dB üzerinde horlama oranları ile OSAS şiddetini arasındaki önemli ilişki gececek çalışmalar ve klinik uygulamalar için önemlidir.

Anahtar Sözcükler: Obezite, OSAS, horlama

INTRODUCTION

Risk factors for obstructive sleep apnea syndrome (OSAS) are; age, male sex, obesity, family history, smoking and alcohol use, and craniofacial anomalies. Obesity is a major risk factor. Increased central fat tissue may cause pharyngeal collapse due to mechanical effect of lung and pharyngeal soft tissue(1,2,3). Snoring is the most common symptom in OSAS which is found in 70-90% of the affected subjects. OSAS incidence is found to be 3.2 times more in people who snore than those who do not snore (4,5).

Many studies have been performed to demonstrate the difference between habitual snoring patients without OSAS and OSAS patients who are also snoring (6,7). Many automatic snoring analysis programs have been developed for this purpose (8,9).

There isn’t any study like the relationship between the severity of the OSAS and snoring sound in obese patients (obesity a BMI > 30 kg / m2) in the literature. In this study, the severity and percentage of snoring that was measured with automatic recorder during polysomnography test were compared with OSAS grade in obese patients.

METHODS

The study included 60 obese patients (BMI≥30) who was performed PSG test in the Gazi University Otorhinolaryngology Department. A complete ENT examination, Muller test and Epworth Sleepiness Scale (ESS) questionnaire were performed before the PSG test. Patients with significant septonasal deformities and maxillofacial anomalies were excluded from the study. Snoring sound analysis was performed on the system simultaneously with PSG record.

Snoring Sound Analyses

Analyses were performed in Noxturnal A1 system, versions 2.0 (Nox Medical ehf Katrinartuni2 IS - 105 Reykjavik, Iceland). The sound signal was amplified and filtered using a second order Butterworth pass-band filter between 70 Hz and 2,000 Hz and then digitized with a sampling frequency of 5,000 Hz and a 12-bit digital converter. The position of the patient was simultaneously captured and digitized using an abdominal sensor. The snoring episodes were then identified by a previously trained and validated automatic detector and analyzer. The snoring detector was designed to identify snoring episodes from simple snorers and OSAS patients, and to reject respiratory sounds from regular inspiration and exhalation, cough, voice, and other artifacts. This pattern allows the distinction between snoring sound and the remaining respiratory sounds. Single Snore events form so called Snore Trains which stand for periods with multiple single Snorers meeting certain time conditions. Snore Train analysis can be performed by the customizable Noxturnal detector (10).

In our study, the snoring sound at 65dB which peaked at least 3 times with 0.2-2 second time duration, was supposed as a snore train on the system. The records were analyzed again for 85 dB sound in the same way. We also recorded the total number of snore trains during the sleep. In this way, the percentages of 65 and 85 dB sound snoring sounds were determined in sleeping period.

Polysomnography

Full-night polysomnography (Nox A1 system, version 2.0, Nox Medical ehf Katrinartuni2 IS - 105 Reykjavik, Iceland) was performed according to standard methods. The PSG was performed by recording EEG, EOG, ECG, EMG, thoracic and abdominal respiratory excursion, oronasal airflow by a thermistor, and blood oxygen saturation by an oximeter. The apnea-hypopnea index (AHI) was calculated as the sum of the apneas and hypopneas divided by the total sleep time.

Snoring subjects were assigned to three groups according to their AHI results as being mild, moderate and severe OSAS, respectively. Group 1 (mild); snorers with an AHI > 5 and <15; group 2 (moderate); snorers with an AHI between 15-30 and group 3 (severe); snorers with an AHI ≥ 30.

Statistical Analysis

All analyses were performed using version 20 of the Statistical Pack age for the Social Sciences (SPSS) software. Student’s T test, Mann-Whitney U test, chi-square test, and Spearman’s correlation efficient test were used. A P value < 0.05 was considered to reflect statistical significance.

RESULTS

Sixty patients with a mean age of 47.8 ± 10.8 years were included in the study. Nineteen subjects were female and 41 were male. The mean BMI was 33.2 ± 3.2. Epworth sleepiness questionnaire was performed for all patients and the mean score was found to be 24.6 ± 12.6.

Demographic data and PSG results were compared. AHI and apnea index in particular were found to be significantly higher in male gender (P < 0.05). Otherwise, there was no significant difference in terms of age, BMI, and ESS questionnaire results between two genders (P > 0.05) (Table 1). Considering snoring sound analysis; there was a significant increase in the rate of snoring over 85 dB in the female obese group compared to the male obese group (Table 2). No significant difference revealed between afore mentioned groups in terms of BMI and age. Statistically significant difference revealed between mild and severe OSAS groups in terms of snoring sound severity (dB) and rates of snoring above 65 and 85 dB during sleep (P < 0.05). There was no statistically significant difference between 65 dB sound and the snoring rates when compared with moderate and severe OSAS group. But we found significant difference for 85 dB snoring sound between the two groups (P< 0.05) (Table 3).

| Table 1. Demographic data and polysomnography findings with statistical comparison between the sex groups |
|---------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| Total                                             | Males                                           | Females                                         | P value                                         |
| Age (years)                                       | Mean ±/SD                                       | Mean ±/SD                                       | Mean ±/SD                                       | Mean ±/SD                                       | ns*                                              |
| BMI                                               | 47.8 ± 10.8                                     | 47.7 ± 11.2                                     | 48.1 ± 10.05                                    | ns*                                              |
| Tr-ESS                                            | 29.93 ± 4.4                                     | 32.7 ± 2.5                                     | 34.3 ± 4.7                                     | ns*                                              |
| AHI                                               | 22.53 ± 12.4                                    | 24.6 ± 12.3                                     | 24.4 ± 13.5                                    | ns**                                             |
| AI                                                | 31.4 ± 25.6                                     | 32.5 ± 26.3                                     | 26.1 ± 18.8                                    | < 0.01**                                         |
| HI                                                | 18.05 ± 22.6                                    | 33.95 ± 29.1                                    | 23.05 ± 24.1                                    | < 0.01**                                         |
| ns: nonsignificant mean p> 0.05, * Student-t test; ** Mann-Whitney U test |

| Table 2. Distribution rate of snoring according to the sex groups |
|---------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| Total                                             | Males                                           | Females                                         | P value                                         |
| dB                                                | 72.03 ± 17.3                                    | 71.7 ± 20.9                                     | 72.5 ± 3.1                                     | ns**                                             |
| r65 (%)                                           | 24.78 ± 19.9                                    | 25.70 ± 19.82                                   | 22.61 ± 20.19                                   | ns**                                             |
| r85 (%)                                           | 1.4 ± 4.1                                       | 1.94 ± 4.7                                     | 0.139 ± 0.59                                    | < 0.01**                                         |
| ns: nonsignificant mean p> 0.05, * Student-t test; ** Mann-Whitney U test |
Conflict of interest

No conflict of interest was declared by the authors.

REFERENCES