치의과학석사 학위논문

A Study on the Clinical Characteristics and Polysomnography of Patients Visited in Snoring and Sleep Apnea Clinic of SNUDH

서울대학교치과병원 코골이·수면무호흡증 클리닉에 내원한 환자의 임상적 특징 및 수면다원검사결과에 관한 연구

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환자의 임상적 특징 및 수면다원검사에 관한 연구

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- ABSTRACT -

A Study on the Clinical Characteristics and Polysomnograpy of Patients Visited in Snoring and Sleep Apnea Clinic of SNUDH

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Obstructive sleep apnea (OSA) is defined as a cessation of breathing by repetitive collapse of the upper airway during sleep resulting in excessive daytime sleepiness and cardiovascular disease. The prevalence is growing and there have been ongoing clinical needs for dentists to play an important role in management of OSA. The aims of this study were to evaluate the clinical characteristics and polysomnography data of patients who visited the Seoul National University Dental Hospital (SNUDH) and to suggest guidelines for the management of sleep disordered-breathing patients in a dental clinic.

Five hundred sixty-two patients who visited the Snoring and Sleep Apnea Clinic of SNUDH were evaluated for clinical characteristics including associated comorbidities, age, gender, BMI, neck circumference, and daytime sleepiness and among them 217 patients examined by polysomnography were evaluated for respiratory disturbance index (RDI), apnea-hypopnea index (AHI), oxygen saturation levels, and sleep stages. The associations among clinical characteristics, sleep parameters, and positional and REM dependencies of the patients were analyzed.

The most common medical comorbidities of the patients were cardiovascular (30.2%), endocrine (10.8%), and respiratory diseases (7.9%). Age (β=0.394), total AHI (β=0.223), and lowest O_2 saturation levels (β=0.205) were significantly associated with the number of comorbidities in patients with OSA. Mean O_2 saturation was not significantly associated with the number of comorbidities.

Non-positional OSA patients had higher BMI, longer neck circumferences, more severe AHI values, and lower mean and lowest O_2 saturation levels compared to positional OSA patients. Not-REM-related patients were older and had more severe AHI values compared to REM-related patients. Not-REM-related patients have longer duration of stage I sleep and shorter stage II, III, and REM sleep than REM-related patients. There were no significant differences in each sleep stage between positional and non-positional patients.

Neck circumference, positional dependency, REM dependency, and percentage

of supine position were significantly associated with severity of OSA. There was no significant difference in total AHI value between Korean and US patients, but Korean patients were younger and had lower BMI and smaller neck circumference than US patients.

Keywords: snoring, sleep apnea, polysomnography, positional dependency, REM dependency

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KOREAN ABSTRACT

I. INTRODUCTION

Obstructive sleep apnea (OSA) is defined as a cessation of breathing by repetitive complete or partial the collapse of upper airway during sleep resulting in sleep fragmentation and oxygen desaturation. Signs and symptoms of OSA include excessive daytime sleepiness, insomnia, nocturia, morning headache, and intermittent hypoxemia. Risk factors for developing OSA include aging, obesity, male gender, menopause, family history, nasal obstruction, alcohol consumption, and craniofacial abnormalities.[1)]

The prevalence of OSA is higher in the elderly and male gender. In a recent Korea study, the prevalence of OSA (AHI >5) was reported to be 27.1% in men and 16.8% in women.[2)] Despite of its high prevalence, recognition of this disease remains low and many recent studies suggested that untreated patients with OSA have high risk of death from all causes, especially cardiovascular comorbities. There are many evidences that OSA causes cardiovascular complications including hypertension, myocardial infarction, stroke and treatment of OSA can improve cardiovascular morbidity and mortality. [3-7)]

Various surgical and non-surgical modalities have been suggested for treating snoring and sleep apnea. For non-surgical modalities, general and behavioral therapy, such as weight loss, smoking cessation, avoidance of alcohol, and changing position during sleep can be a possible treatment. People with moderate to severe apnea are recommended continuous positive airway pressure (CPAP) or oral appliances. While CPAP therapy is the most effective treatment option for most patients with OSA, its discomfort causes less tolerance and compliance. Therefore clinical needs for oral appliance have increased and the role of dentists has become more important in the management of OSA. There are many surgical modalities for treating OSA such as uvulopalatopharyngoplasty (UPPP), orthognathic surgery, and tracheostomy. The type of surgery should be selected according to the individual's anatomy, health status, age, and severity of sleep apnea.

Even though the upper airway space is not significantly different, the severity of OSA can differ according to the patient's sleep position or duration of REM sleep. Cartwright suggested positional patients were defined as those whose AHI is at least twice as high while sleeping in supine position as in non-supine position.[8] Haba-Rubio et al. suggested REM-related patients were defined as those whose AHI during REM sleep is more than twice than that during NREM sleep.[9]

The aim of this study were to evaluate clinical characteristics and polysomnography data of patients with OSA who visited the Seoul National University Dental Hospital (SNUDH) to evaluate the differences in clinical and polysomnography parameters according to positional or REM dependencies, and to analyze risk factors on severity of OSA. We hope our data can provide a guideline for the management of sleep disordered-breathing patients in dental clinics.

II. MATERIALS AND METHODS

Subjects

A Total of 562 patients who visited the Snoring and Sleep Apnea Clinic from January 2007 through August 2014 for the treatment of snoring and sleep apnea were evaluated. Among them two hundred seventeen patients were examined by grade I polysomnography, and 163 patients were analyzed after exclusion of the patients who showed AHI score less than 5.

We classified the patients who were examined by polysomnography according to the existence of positional or REM dependencies on OSA severity. From the 163 subjects, 43 patients were categorized as non-positional OSA patients and 120 patients as positional OSA as suggested by Cartwright.[8] According to the criteria of Haba-Rubio et al.[9], 105 patients were categorized as not-REM-related OSA and 58 patients as REM-related OSA.

This study was approved by the institutional review board of Seoul National University Dental Hospital.

Polysomnography

Level 1 polysomnography including EEG, EOG, chin EMG, leg EMG, ECG, airflow recorded with nasal thermistor and cannula, pulse oximetry, and body position was performed by Alice 5 (Respironics, Pittsburgh, USA).

Apnea was scored when 1) There is a drop in the peak signal excursion by ≥ 90% of pre-event baseline using an oronasal thermal sensor. 2) The duration of the ≥ 90% drop in sensor signal is ≥ 10 seconds. The duration of the event is from the nadir in flow preceding the first breath that is clearly reduced to the start of the first breath that approximates baseline breathing.

Hypopneas were initially scored when 1) The peak signal excursions drop by ≥ 30% of pre-event baseline using nasal pressure. 2) The duration of the ≥ 30% drop in signal excursions is ≥ 10 seconds. 3) There is ≥ 3% oxygen desaturation from pre-event baseline or the event is associated with an arousal.[10] The AHI was defined as the total number of apnea and hypopnea events per hour of sleep. The severity of sleep apnea is commonly defined as the number of apneas or hypopneas per hour of sleep, graded with the apnea-hypopnea index (AHI): 5 to 15 is considered mild; 15 to 30 is considered moderate; and more than 30 is considered severe.

The respiratory disturbance index (RDI) was calculated as the number of apnea plus hypopnea plus respiratory effort related arousal.

Comparison with previous study

In 2010, Chung et al. investigated the differences in and risk factors for positional and non-positional OSA patients.[11] 341 patients (276 men and 65 women, mean age 52.9 ± 12.4 years) were evaluated with grade polysomnography using Apnea Risk Evaluation System (ARES) Unicorder model 500 (Advanced Brain Monitoring, Carlsbad, CA). We extracted data from the database of the study and compared it with the data from our study.

Statistical analysis

Baseline demographics (age, BMI, and neck circumference), total AHI, mean and lowest O_2 saturation levels, and differences between positional and REM dependency were analyzed by independent t-test and Mann-Whitney test. Associations between AHI value and risk factors including gender, age, neck circumference, percentage time in supine position, and positional and REM dependencies were estimated using multiple linear regression analysis. Because AHI value showed non-parametric distribution, the AHI value was log-transformed and then used for multiple linear regression analyses. Differences between Korean and US patients were analyzed by independent t-test, Mann-Whitney test, and Chi-square test.

III. RESULTS

Clinical characteristics of total patients

There were 437 men (77.8%) and 125 women (22.2%) among those who visited SNUDH, Age ranged from 2 to 88 years (mean age 48.9 ± 15.4 years). The most common medical comorbidities of patients were cardiovascular diseases (hypertension, stroke, and heart disease) with the highest percentage of 30.2%, endocrine 10.8%, respiratory 7.9%, gastrointestinal 7.7%, and neuromuscular 5.3%.

Polysomnography Evaluation

Demographics

A total of 163 patients underwent overnight sleep study. Table 1 shows the general characteristics and polysomnographic features. There were 135 men (82.8%) and 28 women (17.2%), age ranged from 11 to 82 years (mean age 44.7 ± 13.2 years). According to their AHI , the distribution of the patients were for mild (AHI 5-14), moderate (15＜AHI＜30), and severe (AHI ＞30); 42.3%, 21.5%, and 36.2%: respectively.

Impacts of sleep parameters on comorbidity

Table 2 and 3 show the results of multiple linear regression analyses of the risk factors on the comorbidities. Age (β=0.394, p＜0.000), total AHI (β=0.223, p=0.022), and lowest O_2 saturation (β=0.205, p=0.027) were significantly associated with number of comorbidities in patients with OSA. However, mean O_2 saturation (β=0.179, p=0.072) was not associated with number of comorbidities after adjustment for the confounding factors in patients with OSA.

Comparison of patients according to positional and REM dependency

There were 120 positional (73.6%) and 43 non-positional OSA patients (26.4%). Descriptive data between positional and non-positional OSA groups are shown in Table 4. There was a significant difference in BMI (24.9 vs. 26.5, p=0.001), neck circumference (37.3 vs. 39.2, p=0.020), and ESS score (8.6 vs. 7.4, p=0.038) between positional and non-positional OSA groups. Non-positional OSA patients had more severe AHI values (p=0.030), lower mean and lowest O_2 saturation levels (p=0.010; $p < 0.000$, respectively) than positional OSA patients. There was no significant difference in each sleep stage between positional and non-positional patients.

One hundred five patients belonged to the not-REM-related group (64.4%) and 58 belonged to the REM-related group. Not-REM-related patients were older (47.2 vs. 40.2, p=0.001) and had more severe AHI values (34.0 vs. 18.2, $p < 0.000$) than REM-related patients. Not-REM-related patients have a longer duration of stage I sleep (34.0 vs. 18.5, $p < 0.000$) and shorter stage II (45.2 vs. 55.7, $p < 0.000$), III (1.6 vs. 4.0, p=0.001), and REM sleep (14.8.0 vs. 18.4, p=0.002) than REM-related group (Table 5).

Impacts of risk factors on AHI

To find the significance of associated factors, multiple linear regression analysis was performed and age, gender, neck circumference, positional dependency, REM dependency, percentage of supine position and REM time were added into the model (Table 6). This results suggested that neck circumference was the most significant contributing factor on log AHI (β=0.405, $p<0.000$). Positional dependency (β=0.190, p=0.025), REM dependency (β=0.271, p=0.002), and percentage of supine position (β=0.200, p=0.016) were also significant contributing factors. Age and gender were not statistically significant factors.

Comparison between Korean and US sleep center

Risk factors such as age (44.7 vs. 52.9, $p<0.000$), BMI (25.3 vs. 31.8, $p<0.000$), neck circumference (37.8 vs. 43.0, $p<0.000$), and percentage of non-positional dependency (26.4 vs. 36.1, p=0.030) were significantly different between Korean and US patients. Nevertheless, there were no significant differences in total AHI value, lowest O_2 saturation, and mean O_2 saturation between Korean and US patients.

IV. DISCUSSION

Sleep-disordered breathing (SDB) disorders are a group of diseases characterized by loud snoring and episodes of apnea or hypopnea. OSA is involved with several comorbities including cardiovascular[4-7], metabolic[12] and neurocognitive diseases.[13] Above all, hypertension is most strongly associated with OSA and OSA is considered as an independent predictor or major cause of hypertension.[4, 14, 15] Comorbid diseases accounted for 40.5% of the total patients and the most common medical comorbidities were cardiovascular diseases with the highest percentage of 30.2%, endocrine 10.8%, respiratory 7.9%, gastrointestinal 7.7%, and neuromuscular 5.3% while hypertension was the most common single disease with 26.3%. These results generally agree with prior studies. In a study performed by Gabbay and Lavie with 23,806 patients in 2012, frequency of hypertension, dyslipidemia, cardiovascular diseases, pulmonary diseases, ENT-related disorder, and diabetes mellitus was 41.1%, 24.2%, 11.5%, 9.9%, 9.1%, and 2.8%, respectively.[16] Marrone et al. investigated 810 patients, comorbidities were systemic hypertension (n = 371, 45.8%), cardiac and vascular diseases (n = 104, 12.8%), chronic obstructive pulmonary disease (n = 103, 12.8%), type 2 diabetes (n = 50, 6.2%), and other severe diseases.[17] In a recent study, Comorbid diseases were present in 56 (43.1%) of the 130 patients; 10 (7%) had lung diseases, 13 (10%) had neuropsychiatric diseases, 17 (13.1%) had endocrine diseases, 28 (21.5%) had gastroesophageal reflux disease, and 29 (22.3%) had cardiovascular system diseases.[18)]

Pathophysiology of upper airway obstruction is multifactorial and complex, leading to a chronic recurrent state of intermittent hypoxemia and reoxygenation during sleep, maintaining a state of oxidative stress, which seems to be the key to development of a number of high morbidity–mortality systematic complications.[19)] This study showed that lowest O_2 saturation levels (β=0.205) were significantly associated with number of comorbidities in patients with OSA. Mean O_2 saturation was not associated with the number of comorbidities in patients with OSA. Recently Min et al. also reported the lowest O_2 saturation level during sleep was the only significant factor influencing the presence of hypertension identified in multivariate analysis (p=0.006). The odds ratio for the lowest O_2 saturation was 0.900, whereas mean O_2 saturation did not show any significant differences.[20)]

In our study, patients with non-positional OSA accounted for 73.6% of the studied patients and had higher BMI, longer neck circumferences, more severe AHI values, and lower mean and lowest O_2 saturation levels. Oksenberg et al. mentioned "positional patients" are on the average thinner, younger, have less severe breathing abnormalities, and preserve better sleep quality than "non-positional patients".[21)] There is a complex relationship between sleep apnea and BMI, age, and positional dependency, so simple comparison may not be acceptable. However, patients with non-positional OSA had more severe overall

AHI values, and showed lower mean O_2 saturation, and higher percentage snoring time compared with the age, gender, and BMI matched positional OSA patients by Chung et al.[11]

The overall prevalence of REM-related OSA was similar with previous studies. O'Connor et al. [22] reported an overall REM SDB prevalence of 33.5% of patients, Haba-Rubio et al. [9] reported that REM SDB accounted for 36.4% of 415 patients with OSA. We didn't divide patients by gender, but previous studies reported that REM-related OSA accounts for a sizable portion of OSA, while demonstrating a female predominance REM-related OSA was also more prevalent in younger subjects within their respective gender category. REM-related OSA patients were younger and had a disorder significantly less severe than patients with not-REM-related OSA as previously reported by others.[23-25]

AHI is the widely used to represent the severity of OSA. Several risk factors have been identified including aging, obesity, male gender, menopause, family history, nasal obstruction, alcohol consumption and craniofacial abnormalities. Obesity is a well-known risk factor suggested as BMI, neck circumferences, and waist-to-hip ratio.[26] In our study, BMI and neck circumference were used to analyze the risk on comorbidities and AHI. Although there was a delicate difference in coefficients, when we put the neck circumference instead of BMI into our regression analysis, we didn't find any difference. Superiority between BMI and neck circumference is controversial. Correlation between neck circumference and AHI/RDI was significant but less when compared to BMI by Pływaczewski et al.[27] On the other hand, Patel and Davidson show waist and neck circumference are better markers for OSA than BMI.[28] A similar finding was also suggested by earlier analysis of the Wisconsin Sleep Cohort Study where including the waist/hip ratio and neck girth in the model and not BMI resulted in the risk of developing OSA.[29] This is explained by the difference in average BMI according to population and ethnicity.

Most of the breathing abnormalities occur while sleeping in the supine position. "Positionality" is perhaps a characteristic of the natural development of the OSA entity.[21] Therefore to change the supine position is one of the treatments for positional OSA patients. As the severity increases, a positional OSA patient may convert into a non-positional one and as the severity decreases, the reverse appears. During REM sleep, supine posture worsens and facilitates the breathing abnormalities.[23] These body position effects prevail over the differences between REM-related and not-REM-related OSA patients.

It is well known that each ethnicity has different clinical and craniofacial characteristics. So it is natural that several studies reported different prevalence and severity of OSA. Li et al. compared Far-East Asian and white men.[30] Although the Asian patients were less obese and had fewer abnormalities in airway measurements, the severity of their obstructive sleep apnea syndrome was similar to that of the white patients. Obesity appears to be a less important risk factor in the Asian patients and Asians have more severe OSA than whites when matched for age, sex, and BMI. We have found no significant differences in total AHI value between Korean and US patients, but Korean patients were younger and had lower BMI, small neck circumference, and higher percentage of non-positional dependency than US patients. Because positional dependency is associated with the severity of AHI and BMI, positional dependency could differ according to ethnicity. In our study, prevalence of OSA with positional dependency was 73.6%. Mo et al.[31] reported 74.7% in Asians, Oksenberg et al.[21] reported 55.9% in Israel, and Chung et al.[11] reported 63.9% in US.

Limitations of the study

There are several limitations in our study. First, each study in the Korean and US sleep centers were performed in different periods, and the patients might not be representative of the nationality. Second, for more precise analyses, comparison with matched group should be added. However, This study focused on overall characteristics and the disparity was too large to make matched group.

In conclusion, there were various comorbidities and the most common medical comorbidity among the patients was cardiovascular diseases. Age, total AHI, and lowest O_2 saturation levels were significantly associated with the number of comorbidities in patients with OSA. Non-positional OSA patients and not-REM-related patients had a significantly more severe disorder. Neck circumference, positional dependency, REM dependency, and percentage of supine position were significantly associated with severity of OSA. There were no significant differences in total AHI value, but Korean patients were younger and had lower BMI and smaller neck circumference than US patients.

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Table 1. General characteristics and polysomnographic data

Characteristics	Mean	Range
Age (year)	44.7 ± 13.2	11-82
BMI (kg/m^2)	25.3 ± 3.3	17.7-35.1
Neck circumference (cm)	37.8 ± 3.7	27-44.5
ESS score	8.2 ± 4.5	0 - 24
Total AHI	28.4 ± 23.5	5.1 - 117.2
Supine AHI	35.1 ± 26.2	0 - 117.4
Lateral AHI	12.8 ± 22.2	0 - 109.2
Total RDI	35.3 ± 21.9	6.6 – 118.3
Percentage SPO_2 <90 (%)	4.2 ± 8.1	0 - 42.4
Lowest O_2 saturation (%)	81.7 ± 8.9	38 - 95
Mean O_2 saturation (%)	95.4 ± 1.9	89 - 99
Sleep Stage I (%)	28.5 ± 15.6	2.5 - 89.9
Sleep Stage II (%)	48.9 ± 14.0	10.1 - 73.4
Sleep Stage III (%)	2.5 ± 7.8	0 - 72.6
REM Sleep (%)	16.01 ± 7.3	0 - 35.2

Abbreviations: BMI, body mass index; ESS, Epworth Sleepiness Scale; AHI, apnea hypopnea index; RDI, respiratory disturbance index; REM, rapid eye movement.

Table 2. Multivariate linear regression analysis of the risk factors on the comorbidity.

Risk factors	Coefficient	β-value	P-value
Age (year)	0.030	0.394	0.000
BMI (kg/m^2)	0.025	0.080	0.320
Total AHI	0.009	0.223	0.022
Lowest O_2 saturation (%)	0.023	0.205	0.027
Total sleep time (min)	0.002	0.132	0.088

Multivariate analysis of variance, adjusted R^2=0.458.
Abbreviations: BMI, body mass index; AHI, apnea-hypopnea index.

Table 3. Multivariate linear regression analysis of the risk factors on the comorbidity.

Risk factors	Coefficient	β-value	P-value
Age (year)	0.030	0.395	0.000
BMI (kg/m^2)	0.031	0.097	0.266
Total AHI	0.008	0.194	0.045
Mean O_2 saturation (%)	0.097	0.179	0.072
Total sleep time (min)	0.002	0.134	0.090

Multivariate analysis of variance, adjusted R^2=0.450.
Abbreviations: BMI, body mass index; AHI, apnea-hypopnea index.

Table 4. Comparison of polysomnographic data according to positional dependency

Characteristics	Positional (n = 120)	Non-positional (n = 43)	P-value
Age (year)	45.3 ± 14.2	43.2 ± 10.4	0.302*
BMI (kg/m^2)	24.9 ± 3.1	26.5 ± 3.4	0.006*
Neck circumference (cm)	37.3 ± 3.9	39.2 ± 2.8	0.020**
ESS score	8.6 ± 4.6	7.0 ± 4.0	0.038**
Total AHI	25.2 ± 20.6	37.4 ± 28.8	0.030**
Lowest O_2 saturation (%)	82.5 ± 8.8	79.4 ± 8.9	0.010**
Mean O_2 saturation (%)	95.7 ± 1.7	94.4 ± 2.0	0.000**
Sleep Stage I (%)	28.1 ± 13.8	29.7 ± 20.1	0.520**
Sleep Stage II (%)	49.3 ± 13.0	47.9 ± 16.8	0.888**
Sleep Stage III (%)	2.8 ± 8.8	1.5 ± 3.6	0.649**
REM Sleep (%)	16.3 ± 7.0	15.3 ± 8.3	0.436*

Abbreviations: BMI, body mass index; ESS, Epworth Sleepiness Scale; AHI, apnea hypopnea index; REM, rapid eye movement.*P value was obtained from independent t-test.
**P value was obtained from Mann-Whitney test.

Table 5. Comparison of polysomnographic data according to REM dependency

Characteristics	Not-REM-related (n = 105)	REM-related (n = 58)	P-value
Age (year)	47.2 ± 13.2	40.2 ± 12.4	0.001*
BMI (kg/m^2)	25.3 ± 3.2	25.5 ± 3.5	0.760*
Neck circumference (cm)	38.2 ± 3.6	37.1 ± 4.0	0.230**
ESS score	8.1 ± 4.7	8.4 ± 4.2	0.540**
Total AHI	34.0 ± 25.6	37.4 ± 28.8	0.000**
Lowest O_2 saturation (%)	80.6 ± 9.7	83.6 ± 7.1	0.066**
Mean O_2 saturation (%)	95.1 ± 2.0	95.8 ± 1.6	0.079**
Sleep Stage I (%)	34.0 ± 16.0	18.5 ± 8.6	0.000**
Sleep Stage II (%)	45.2 ± 14.2	55.7 ± 11.1	0.000**
Sleep Stage III (%)	1.6 ± 5.9	4.0 ± 10.3	0.001**
REM Sleep (%)	14.8 ± 7.6	18.4 ± 6.2	0.002*

Abbreviations: BMI, body mass index; ESS, Epworth Sleepiness Scale; AHI, apnea hypopnea index; REM, rapid eye movement.
*P value was obtained from independent t-test.
**P value was obtained from Mann-Whitney test.

Table 6. Multivariate linear regression analysis of the risk factors on AHI.

Risk factors	Coefficient	β-value	P-value
Age (year)	0.009	0.160	0.055
Gender (male)	0.345	0.172	0.069
Neck circumference (cm)	0.088	0.405	0.000
Non-positional OSA	0.350	0.190	0.025
Not-REM-related OSA	0.480	0.271	0.002
Percentage of Supine position (%)	0.006	0.200	0.016
REM Sleep (%)	-0.017	-0.149	0.062

Multivariate analysis of variance, adjusted R^2=0.583.
Abbreviations: REM, rapid eye movement.

Table 7. Comparison between Korean and US sleep centers.

Variables	SNUDH (n = 163)	USC (n = 341)	P-value
Age (year)	44.7 ± 13.2	52.9 ± 12.4	0.000*
BMI (kg/m^2)	25.3 ± 3.3	31.8 ± 6.2	0.000**
Neck circumference (cm)	37.8 ± 3.7	43.0 ± 4.2	0.000**
Non-positional OSA (%)	26.4	36.1	0.030†
Total AHI	28.4 ± 23.6	24.8 ± 20.3	0.170**
Lowest O_2 saturation (%)	81.7 ± 8.9	78.0 ± 8.8	0.000**
Mean O_2 saturation (%)	95.4 ± 1.9	95.0 ± 2.4	0.221**

Abbreviations: BMI, body mass index; AHI, apnea hypopnea index.
*P value was obtained from independent t-test.
**P value was obtained from Mann-Whitney test.
† P value was obtained from chi-square test.

국문초록

서울대학교치과병원 코골이 수면무호흡증 클리닉에 내원한 환자의 임상적 특징 및 수면다원검사에 관한 연구

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1. 목 적

수면호흡장애(Sleep-disordered breathing)는 수면 시 기도의 폐쇄로 나타나는 수면장애로 심혈관계질환, 주간졸리움증 및 인지 능력의 장애를 유발할 수 있다. 최근 비만 인구의 증가와 환경의 변화, 스트레스, 과로 등에 의하여 국내에서도 그 발생률이 점차 높아지고 있으며, 치과영역에서도 구강내장치를 이용한 치료방법이 개발되어 코골이와 수면무호흡증을 효과적으로 치료하고 있다. 본 연구의 목적은 서울대학교치과병원에 내원한 수면호흡장애 환자의 임상적 특징 및 수면다원검사 결과를 분석하여 치과영역에서의 수면호흡장애 치료의 임상적 지표를 제시하는데 있다.

2. 방 법

서울대학교치과병원 구강내과 코골이 수면무호흡증 클리닉에 내원한 562 명의 환자들의 임상적 특징과 217 명의 수면다원검사 결과를 분석하였다. 코골이 및 수면무호흡증과 동반되어 나타날 수 있는

전신질환유무, 연령, 성별, 체질량지수, 엡워스 졸리움증 지수 (Epworth sleepiness score) 등을 조사하였으며, 수면다원검사를 시행한 환자들의 호흡장애지수 (respiratory disturbance index, RDI), 무호흡-저호흡지수 (apnea-hypopnea index, AHI), 산소포화도, 수면단계(sleep stage) 분포 등과 자세의존성 (positional dependency) 및 REM 수면 의존성 (REM dependency)의 관련성을 분석하였다.

3. 결 과

내원한 환자들의 수면무호흡증과 관련된 전신질환은 심혈관계 (30.2%), 내분비계 (10.8%), 호흡기계 (7.9%) 질환의 순서로 많았다. 연령 (β=0.394), AHI (β=0.223), 최소 산소포화도 (β=0.205)는 전신질환의 수와 유의한 상관관계를 나타냈으나 평균 산소포화도는 유의한 상관관계를 보이지 않았다.

비자세의존성 수면무호흡증 환자는 자세의존성 환자에 비해 체질량지수가 높고, 목 둘레 길이가 길며 수면무호흡-저호흡지수가 더 높았으며 평균 및 최소 산소포화도가 낮게 나타났다. REM 수면 비의존성 수면무호흡증 환자는 REM 수면 의존성 환자에 비해 연령이 높고 무호흡-저호흡지수가 더 높게 나타났다. 수면 단계의 비율은 REM 수면 의존성에 따른 유의한 차이가 있었으나 자세의존성에 따른 유의한 차이는 나타나지 않았다. 목 둘레, 자세의존성, REM 수면 의존성 및 수면 시 앙와위의 비율은 무호흡-저호흡지수와 유의한 상관관계를 나타냈다. 한국 환자들은 미국 환자들에

비해 연령이 적고 체질량지수 및 목의 둘레가 작았으나 전체 무호흡-저호흡지수에는 유의한 차이가 나타나지 않았다.

주요어 : 코골이, 수면무호흡증, 수면다원검사, 자세의존성,
REM 수면 의존성

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