

Investigating CPAP Compliance in Patients with Obstructive Sleep Apnea

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Abstract

Objective: Our aim in this study is to investigate, in patients who are advised to use CPAP, the rate of usage, differences between the patients who use the device and those who don't; and the factors affecting the compliance rates.

Methodology: A telephone survey was applied to the patients who underwent polysomnography, between the years 2010 -2015 and were thereafter advised to use CPAP as the treatment method.

Results: Total number of patients included in the study was 108. Of them, 77 (71%) was male and 31 (29%) was female. The mean age was 50 (± 11). There were 47 (43,5%) patients with comorbidities. Of 108 patients, 63 (58%) reported using CPAP at the time of the survey and

45 (42%) reported having abandoned the treatment, 62% (n: 28) of this 45 patients reported that they ceased the CPAP use within the first week of their treatment. Of 63 patients using CPAP, 3 (5%) was found noncompliant while 60 (95%) was found compliant.

Conclusion: In our study, rate of CPAP use was found to be 55%. The difference between the mean ages of CPAP users and non-users was found statistically significant (p: 0,008). The results of our study suggests that BMI is not a factor that affects the rate of CPAP use. In our study, contrary to what would be expected, the mean CPAP pressure of the patients using the device were found to be higher than that of non-users.

Keywords: Sleep surgery; Obstructive sleep apnea; Continuous positive airway pressure; Adherence

Introduction

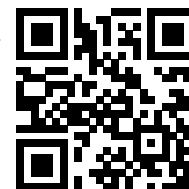
Obstructive sleep apnea (OSA) is the most frequently encountered form of sleep-related respiratory disorders which is characterized by repetitive episodes of complete or partial upper airway collapse¹. There is a gradual increase in OSA prevalence in parallel with the growing number of obesity cases and recent studies suggest that it affects more

than 13% of male and 6% of female population². OSA constitutes a serious social and economic problem for the society with its negative effects on the quality of life and contribution to cardiovascular morbidity. It is a known fact that the most effective treatment strategy for OSA is "continuous positive airway pressure (CPAP)"^{3,4}. CPAP is the

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most frequently used and most effective treatment choice and compliance with it has utmost importance in preventing cardiovascular and metabolic complications of OSA.

The term compliance refers to ratio of the number of patients who receive CPAP treatment during the course of required period on a regular basis to the number of all patients who are advised to receive CPAP treatment⁵. CPAP compliance has been defined as use of CPAP at least 70% of the time over a week (five or more days), for at least 4 hours every night⁶⁻⁸.

There are varying figures in the literature regarding the compliance rates in patients using CPAP or similar devices. When based on self-reported data, compliance rates are reported to range from 65% to 90% while the data taken from the data cards inside the machines show compliance rates of around 50%⁹⁻¹¹. There is limited data on CPAP compliance rates in our country. Our aim in this study is to investigate, in patients who are advised to use CPAP, the rate of usage, differences between the patients who use the device and those who don't; and the factors affecting the compliance rates by using our own laboratory data. A telephone survey was applied to the patients with accessible records who underwent polysomnography, 108 patients who agreed to take part, were included in the study.

Materials and Method

A telephone survey was applied to the patients with accessible records who underwent polysomnography in the sleep laboratory in the Department of Otorhinolaryngology of XXXX between the years 2010 and 2015 and were thereafter advised to use CPAP as the treatment method. The study was initiated after the approval of Hacettepe University Ethics Board was obtained. Of the patients whose retrospective records were accessed, 108 agreed to take part in the telephone survey and were included in the study. Patients using Auto-PAP and BiLevel PAP were not included. Participants were addressed the questions shown in Table 1. In addition to these, AHI and CPAP titration pressure available in medical charts of the patients were added into the data obtained.

CPAP compliance was defined as use of CPAP at least 70% of the time over a week (five or more days), for at least 4 hours every night. Body Mass Indexes of the patients were calculated by using the available height and weight

Table 1: Survey Form for Investigating CPAP Compliance in Patients Diagnosed with Obstructive Sleep Apnea

1. Gender
2. Age
3. Height (cm)/ Weight (kg)
4. Presence of a comorbid disease
5. History of nasal surgery
6. History of OSA surgery
7. Is the patient still using CPAP?
8. CPAP use (how many nights a week / how many hours a night)
9. Duration of CPAP use until discontinuation
10. The reason for discontinuation
11. AHI and CPAP pressure

data (kg/cm²). A categorization was made for the patients who did not use CPAP anymore according to when they stopped using the device: during the first week, during the first month, during the first year and after the first year. The reasons for not using CPAP was collected under the subtitles of “feeling of suffocation”, “feeling of pressure on the face”, “dryness in mouth and/or nose”, and “not being able to fall asleep with the device attached”.

Patients using and not using CPAP were separated and a comparison was made between these two groups. In the statistical evaluation, “T” test was used in comparing the means of parametric data, Mann Whitney U test was used in comparing the means of non-parametric data, Chi-square test was used in comparing the proportions of parametric data and, again, Chi-square test was used in comparing the proportions of non-parametric data.

Results

Total number of patients included in the study was 108. Of them, 77 (71%) was male and 31 (29%) was female. Ages of the patients ranged between 21 and 79, and the mean age was 50 (±11). The mean AHI of the group was 49 (±25). There were 47 (43,5%) patients with comorbidities. Information about these diseases are provided in Table 2 in detail. 61 (56,5%) patients did not have comorbid diseases. The most common comorbidity among the patients who were advised to use CPAP was hypertension (43%).

Table 2: Distribution of the comorbid diseases

Hypertension	20 (43%)
Diabetes mellitus	11 (23,5%)
Coronary artery disease	4 (8,5%)
Hyperlipidemia	1 (2%)
Pulmonary diseases (COPD, asthma)	3 (6%)
HT+CAD	5 (11%)
HT+DM	3 (6%)
Total	47

The number of patients who did not undergo a surgery was 75 while 31 patients had nasal surgery (septoplasty, septorhinoplasty, conchal surgery etc.) and 2 had palate surgery (pharyngoplasty, palate radiofrequency etc.).

Of 108 patients, 63 (58%) reported using CPAP at the time of the survey and 45 (42%) reported having abandoned the treatment. Of 63 patients using CPAP, 3 (5%) was found noncompliant while 60 (95%) was found compliant (Table 3). The average use of CPAP was 6,2 nights a week and 6,4 hours a night. After the questioning of 45

patients who ceased to use the device about when they abandoned the treatment, it was revealed that 28 patients had stopped using CPAP during the first week, 4 patients during the first month, 8 patients during the first year and 5 patients after the first year (Table 4). The reason for discontinuation was feeling of suffocation in 17 (38%), not being able to fall asleep with the device attached in 12 (27%), feeling of pressure on the face in 10 (22%), and dryness in mouth and nose in 6 (13%) patients.

Patients were separated into two groups as the the ones who use CPAP and the ones who don't. Means of parametric variables of these two groups like age, BMI (body mass index), AHI and CPAP pressure were compared (Table 4). The mean age of the group which includes users was found to be 52,1 (± 12) while it was 46,4 (± 8) in the group of non-users. The difference between the mean ages of these two groups was statistically significant ($p: 0,008$). The mean BMI and AHI of the group of nonusers were respectively 30 (± 3), 47 (± 23), likewise of users group with 30(± 3) and 50 (± 26). The difference between the BMI and AHI of these two groups was statistically insignificant ($p:$

Table 3: Evaluation of CPAP compliance and duration of CPAP use until discontinuation

		number (%)		number (%)
			<i>when they stopped using the device</i>	
			<i>during the first week</i>	28 (62%)
			<i>during the first month</i>	4 (9%)
			<i>during the first year</i>	8 (18%)
			<i>after the first year</i>	5 (11%)
<i>non-users</i>		45 (42%)		
<i>users</i>	<i>compliant</i>	60 (55%)		
	<i>noncompliant</i>	3 (3%)		

Table 4: Group statistics

	Use	N	mean	p<0,05
age	user	63	52,1	0,008*
	non-user	45	46,4	
BMI	user	63	30	0,84
	non-user	45	30,1	
AHI	user	63	50,6	0,47
	non-user	45	47,1	
CPAP pressure	user	63	10,4	0,039*
	non-user	45	9,9	

0,841 for BMI, $p: 0,477$ for AHI). When comparing the CPAP pressure between these two groups; we saw that the mean CPAP pressure was 10 (± 1) in the users group, but the mean pressure of the group of nonusers was surprisingly lower as 9 (± 1). The difference between the mean CPAP pressure of these two groups was statistically significant ($p: 0,039$).

An assessment of the gender distribution between these two groups revealed that the rate of usage is 56% in men while it is 66% in women. No statistically significant difference was found between these rates ($p: 0,307$). 31% of the patients with comorbid diseases was in the group of CPAP users while 16% of them had stopped using the device. No statistically significant difference was found between these rates, either ($p: 0,158$). Of 33 patients who underwent nasal surgery before being advised to use CPAP, 22 were in the group of users.

Discussion

It is a known fact that CPAP and other PAP devices are the most effective treatment methods for OSA¹². However, lower compliance rates limit the effectiveness of the treatment. There is no doubt that specifying the features of the patients who do not use CPAP will be helpful in taking necessary measures and ensuring more efficient use of CPAP devices. The authors studying the subject agree that the average rate of CPAP use ranges between 50% and 60%¹¹⁻¹³. In a study conducted in Turkey with a series of 133 patients, CPAP compliance rate was reported as 63,9%¹⁴. Several studies from other countries showed much higher rates (80-90%)¹⁰⁻¹⁵. In our study, rate of CPAP use was found to be 55% and this finding is in parallel with the widely accepted rates. The compliance rate of 95% in the patients using CPAP shows that our patients use their devices efficaciously. Patients using CPAP have high rates of use of 6,2 nights a week and 6,4 hours a night. 62% (n: 28) of 45 patients who do not use the device reported that they ceased the CPAP use within the first week of their treatment. The percentage of the patients who stopped using CPAP within the first month into their treatment reaches up to 9% (n: 4). This proves the necessity and importance of close and frequent follow-up of the patients after the initiation of treatment. The feeling of suffocation

stands out as the most common reason of discontinuation with the treatment in our patients.

Although possible predictive factors affecting CPAP use have been excessively investigated recently, no consistent data regarding this issue is available. In a study conducted by Gay et al.¹⁶ the factors affecting CPAP use were investigated and a number of variables like the presence of severe OSA, use of nasal mask, patient training and frequent controls were reported to increase the rate of CPAP use and compliance.

Despite the general opinion that patients with severe OSA are more likely to use CPAP as they suffer more greatly from the disease and that the rate of CPAP use is relatively higher in this group; in our patient group, no difference was found between the mean AHI values of the patients who still used CPAP and the patients who didn't. Similarly, there were no significant differences between the rates of use in the patients with comorbid diseases and others. These findings suggest that patients who need treatment priority such as those with severe OSA whose cardiovascular risks are higher when compared to other OSA patients and those who have comorbidities like CAD and HT should be better informed about their disease and treatment needs.

In our study, the difference between the mean ages of CPAP users and non-users was found statistically significant ($p: 0,008$). With a mean age of 52, the group of CPAP users was averagely 6 years older than the group of those who did not use the device. The higher rates of use with increasing ages may be associated with the decrease in the number of social factors that would limit CPAP use and increase in the sedentary time due to lower rates of active working. Although the difference in the gender distribution between the group of users and the group of non-users was not statistically significant, it should be noted that the rate of use was higher in women (67%) than in men (56%). Obesity has been reported in several studies as a variable that affects CPAP use positively^{17,18}. However, the results of our study suggests that BMI is not a factor that affects the rate of CPAP use.

Several studies in the literature pointed out high pressure level of CPAP as an important cause of intolerance in CPAP use^{19,20}. It is also known that endonasal surgeries and treatments like tonsillectomy that decrease CPAP pressure

increase tolerance. In our study, contrary to what would be expected, the mean CPAP pressure of the patients using the device were found to be higher than that of non-users. This finding contradicts the assertion that high CPAP pressure has a negative effect on the treatment. It was thus inferred in our study that abandonment of the treatment due to “feeling of suffocation” did not arise from high pressure.

Conclusion

Patients who do not use CPAP were in the younger age group. Means of the variables such as AHI and BMI were

not different in the groups of users and non-users. High CPAP pressure did not have a negative effect on the rates of use. Importance of the treatment should be explained to the patients, especially to the severe cases and the ones with comorbid diseases. Particular attention should be paid on implementing frequent follow-up procedures on all patients after the initiation of CPAP treatment.

Conflict of Interests

The authors have no conflict of interests to declare. In this study, no financial assistance was used.

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