Original Research

Continuous Positive Airway Pressure Adherence in Patients with Obstructive Sleep Apnea Syndrome

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Abstract

Background and Objective: Obstructive sleep apnea syndrome (OSAS) is a common sleep disorder with serious consequences. The best treatment for moderate to severe OSA is continuous positive airway pressure (CPAP), and is associated with reduced OSA-related adverse consequences. However, poor adherence to CPAP is still an important issue in these patients. This study aimed to evaluate CPAP adherence, and predisposing factors for poor adherence.

Materials and Methods: In this longitudinal study, 120 patients with confirmed OSAS who underwent positive airway pressure titration study were enrolled. After at least six months of CPAP therapy, the subjects were evaluated for CPAP adherence.

Results: Of 120 participants, 40 (33.3%) used CPAP device for at least 4 hours per night in 70% of nights after at least 6 months of prescription (compliant subjects). Older age was associated with more CPAP adherence (54.3 ± 11.3 vs. 49.3 ± 12.0, P = 0.037). Patients with higher prescribed device pressure were less likely to use CPAP regularly (8.7 ± 5.4 vs. 24.3 ± 44.2, P = 0.049). Difficult breathing and discomfort with full-face mask were the most common reported problems by compliant patients.

Conclusion: Poor adherence to CPAP therapy is a serious issue in patients with OSAS. Older age and lower CPAP-device pressure were associated with favorable adherence. More interventions should be evaluated for improving acceptance and adherence of CPAP therapy among the patients with OSAS.

Keywords: Obstructive sleep apnea syndrome; Continuous positive airway pressure; Patient adherence

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Introduction

Obstructive sleep apnea (OSA) is a common sleep disorder affecting 24% of men and 9% of women. OSA syndrome with daytime sleepiness may lead to impaired cognition and higher rates of accidents, hypertension, metabolic syndrome, and increased mortality due to cardiovascular and cerebrovascular diseases (1, 2). Polysomnography (PSG) is the gold standard test for OSA diagnosis (3, 4).

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Continuous positive airway pressure (CPAP) is the gold standard treatment for moderate to severe OSA. CPAP reduces frequent collapse of upper airway during sleep. CPAP therapy in patients with OSA is associated with less daytime sleepiness, decreased motor vehicle accidents, and better quality of nighttime sleep. Many studies have suggested that CPAP therapy should be considered as the first-line treatment for moderate to severe OSA, due to the improved daily functions (5-8). Despite the agreement on CPAP therapy in patients with moderate and severe OSA, poor CPAP adherence still is an important issue. Many patients with OSA stop using the device after some time, leading to an adherence rate of

30-60 percent in different studies. Non-adherence of CPAP is usually followed by non-acceptance of using CPAP-device (9, 10). It also could be attributed to other reasons for poor adherence such as complications of PAP treatment, which includes mask discomfort, nasal drying, nasal irritation, and intolerance to pressure of CPAP-device (11).

The evaluation of factors associated with the poor adherence to CPAP would help clinicians to find more efficient strategies for increasing CPAP adherence. Limited data is available regarding adherence to CPAP in our patients. Therefore, the aim of this study was to evaluate the rate and associated factors of adherence to CPAP-device among the patients with OSA referred to a sleep clinic.

Materials and Methods

This was a longitudinal study conducted in Baharloo Sleep Clinic affiliated to Tehran University of Medical Sciences, Tehran, Iran. Patients with confirmed OSA with respiratory disturbance index (RDI) of ≥ 15, who underwent positive airway pressure titration study for treatment, were enrolled in this study. A total of 120 patients were recruited. Patients, who refused to use CPAP-device were excluded.

After at least six months of PAP therapy with CPAP mode, subjects were asked to answer a questionnaire including demographic characteristics, hours and days of CPAP usage, and adverse effects of CPAP therapy such as nasal irritation and drying, via telephone interview. Written consent was obtained from the patients at the first visit.

CPAP adherence was defined as "usage of CPAP for at least 4 hours per night, and in 70% of nights per month" (12).

PSG: PSG is the gold standard test for diagnosis and determination of the severity of OSA. Electroencephalography, electrooculography, electrocardiography, and electromyography were recorded during overnight polysomnography study. RDI of equal or more than 15 and 30 were categorized as moderate and severe OSA, respectively. Analysis and interpretation of patients' polysomnography was performed according to the American Academy of Sleep Medicine (AASM) guideline (13). Sleep efficiency, arousal index, and mean O_2 saturation were recorded for further analyses (4).

CPAP titration: All the participants who were recommended to use CPAP device for treatment of OSA underwent a second night test for titration of CPAP according to the AASM guideline (13). All of the participants used CPAP device with a fixed pressure.

Statistical analysis: Data were presented as mean ± standard deviation, or number (percentage). Mann–Whitney U test was used for comparing continuous variables. Chi-square test was used to assess differences in sex, marital, and educational status between compliant and non-compliant patients. P value of less than 0.05 was considered as statistically significant. Statistical analyses were performed using SPSS for Windows software (version 22.0, IBM Corporation, Armonk, NY, USA).

Results

In current study, 92 patients (76.7%) were men. The mean age of the participants was 50.9 ± 11.9 years. The mean body mass index (BMI) and RDI was 31.1 ± 5.0 kg/m^2, and 59.7 ± 49.4, respectively.

Out of 120 patients undergone titration study, 40 (33.3%) used CPAP device for at least 4 hours per night in 70% of all nights after at least 6 months of prescription (compliant subjects). The most common complaints of these patients were snoring and morning headache which were reported in 34 (85%) and 12 (30%) of participants, respectively. Demographic and polysomnographic characteristics of compliant and non-compliant patients are shown in table 1.

Increasing age was associated with more CPAP adherence (54.3 ± 11.3 vs. 49.3 ± 12.0, P = 0.037). Patients with higher prescribed device pressure were less likely to use CPAP regularly (8.7 ± 5.4 vs. 24.3 ± 44.2, P = 0.049). Accordingly, lower pressures of CPAP-device were more tolerated by the subjects.

All the compliant patients reported some weight loss less than 5 kilograms after six months of treatment. Freshness and feeling satisfied with CPAP device after treatment was reported by 37 compliant patients (92%).

Complications of CPAP therapy reported by compliant participants are shown in table 2. Humidifier use and chin strap use during CPAP therapy were reported by 34 (85%) and 10 (25%) compliant patients, respectively. The most common complication among CPAP users was difficult breathing and discomfort with full-face mask. Full-face mask was used by 30 patients (75%); while the rest of the participants used nasal mask.

Table 1. Demographic and polysomnographic characteristics of participants

Variable	Compliant patients (n = 40) (Mean ± SD)	Non-compliant patients (n = 80) (Mean ± SD)	P-value
Age (year)	54.3 ± 11.3	49.3 ± 12.0	0.037
BMI (kg/m^2)	31.7 ± 6.0	30.8 ± 4.6	0.390
RDI	55.3 ± 21.7	55.4 ± 21.6	0.980
Sleep efficiency (percent)	74.8 ± 13.4	79.5 ± 11.4	0.060
Arousal Index	21.8 ± 16.1	24.3 ± 14.9	0.620
Mean o_2 saturation	88.4 ± 5.9	89.7 ± 4.3	0.210
CPAP-Device pressure (cmH_2o)	8.7 ± 5.4	12.1 ± 4.6	0.022
Variable	**Number (%)**	**Number (%)**	**P-value**
Sex (men)	28 (70.0)	64 (80.0)	0.220
Education (Diploma and more)	30 (75.0)	61 (76.2)	0.740
Marital status (married)	34 (85.0)	74 (92.0)	0.130

SD: Standard deviation; BMI: Body mass index; RDI: Respiratory disturbance index; CPAP: Continuous positive airway pressure

Table 2. Complications of CPAP therapy reported by compliant participants

Complications	Never or rarely	Intermittent or repeated
Nasal irritation	37 (92.5)	3 (7.5)
Nasal drying	37 (92.5)	3 (7.5)
Chest discomfort	36 (90.0)	4 (10.0)
Bloating	33 (82.5)	7 (17.5)
Congested eye	33 (82.5)	7 (17.5)
Difficult breathing	13 (32.5)	27 (67.5)

* Data are presented as number (percent)
CPAP: Continuous positive airway pressure

Discussion

The CPAP adherence in the present study was estimated to be 33.3%. Older age and lower CPAP pressure were associated with more patient adherence, while educational and marital status, BMI, and RDI did not have significant correlation with patients' adherence.

Current findings were consistent with several studies that have estimated CPAP adherence between 30 to 60% (9, 10). Older age was correlated with more CPAP adherence in our study along with Collen et al. study, in which, age and one-time use of sedative-hypnotic drugs were associated with better CPAP adherence (14).

Other polysomnographic characteristics such as sleep efficiency, arousal index, and mean O_2 saturation were not associated with more CPAP adherence. Compliant patients were more likely to have poor sleep quality than non-compliant ones, indicated by sleep efficiency in their first night polysomnography; but the trend was not statistically significant. However, inconsistent with previous literature (15), RDI as an index of OSA severity was found to be not related to CPAP adherence in the present study. This may be due to the limited sample size, cultural issues in acceptance and adherence of CPAP device, and insufficient education of patients prior to PAP titration study. Patients' adherence was defined by self-report, which is subject to bias. Using CPAP-device reports for adherence definition may provide more accurate findings, and even more estimates of adherence in our participants.

Difficult breathing and mask intolerance was of the most common complaints of our patients for CPAP use along with Zozula and Rosen study (11). However, unlike their study, nasal drying or irritation reported by a few patients in the current study.

Inference of results in this study to larger populations should be performed with more caution.

According to many studies, despite patient coaching and various behavioral interventions in recent years, CPAP adherence is still poor (16). More studies are required to evaluate the efficacy of different interventions such as cognitive-behavioral therapy in CPAP adherence.

Conclusion

Along with many studies, CPAP adherence is estimated to be poor in the current study. More investigations are warranted for evaluating associated risk factors of CPAP adherence. Future studies using objective information for CPAP adherence is recommended.

Conflict of Interests

Authors have no conflict of interests.

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