

ADHERENCE TO CONTINUOUS POSITIVE AIRWAY PRESSURE THERAPY: HOW MUCH DOES THE START MATTER?

ROMICĂ BURCEA^{1,3*}, ANCUȚA-ALINA CONSTANTIN^{2,3}, FLORIN DUMITRU MIHALȚAN^{2,3}

¹*Pneumology II, Pneumology Hospital, Roșiori de Vede, Romania*

²*Pneumology III, Institute "Marius Nasta", Bucharest, Romania*

³*"Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania*

*corresponding author: romica.burcea@drd.umfcd.ro

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Abstract

Continuous Positive Airway Pressure (CPAP) therapy has a beneficial effect on the severity of Obstructive Sleep Apnea Syndrome (OSAS). It is used indefinitely, typically for the patient's entire life. In this study, we sought to determine whether there was a statistical association between the first period of CPAP use and future adherence. The study included 86 patients diagnosed with Obstructive Sleep Apnea Syndrome, divided into two categories: adherent and non-adherent to CPAP. Patients completed a questionnaire at one month of therapy to assess factors related to adherence and the reasons for its suboptimal use. At the descriptive level, 38.9% of non-adherents had good adherence from the first night, while 90.0% of adherents reported a positive experience. Among non-adherents, only 41.7% reported good adherence in the first week, compared with a significantly higher percentage 98.0% among adherent patients. A comfortable and effective use right from the first night and the first week is associated with an increased likelihood of maintaining long-term CPAP therapy.

Rezumat

Terapia cu presiune pozitivă continuă la nivelul căilor aeriene (CPAP) are un efect benefic asupra severității sindromului de apnee în somn (SASO). Aceasta se folosește pentru o perioadă nedeterminată, în general pentru toată viața pacientului. În acest studiu am analizat dacă există o legătură statistică între prima perioadă cu terapia CPAP și aderența viitoare. Studiul a inclus 86 de pacienți diagnosticați cu SASO, împărțiți în două categorii: aderenți și non-aderenți la terapia CPAP. Pacienții au completat un chestionar după o lună de terapie, fiind analizați factorii implicați în aderența la terapie și cauzele pentru folosirea suboptimală. La nivel descriptiv, 38.9% dintre pacienții non-aderenți au avut o aderență bună în prima noapte de terapie, în timp ce 90% dintre pacienții aderenți au raportat o bună aderență în această noapte. În ceea ce privește pacienții non-aderenți, doar 41.7% din ei au raportat o aderență bună în prima săptămână, comparativ cu un procent mult mai mare în cazul pacienților aderenți (98%). O utilizare eficientă și confortabilă încă din prima noapte și din prima săptămână a terapiei CPAP poate fi predictivă pentru utilizarea pe termen lung a terapiei.

Keywords: apnea, CPAP, adherence, first period

Introduction

Sleep is generally defined as a recurring, reversible natural state characterized by reduced consciousness and body movement, regulated by multiple factors, including homeostatic and circadian processes (1). The neuronal and physiological architecture of sleep differs across animals and is well preserved in both vertebrates and invertebrates (2). Sleep deprivation can negatively affect the patient's affectivity (3). Short-term deprivation affects memory and attention, but less so activities of great complexity (4). OSAS is less well known in Romania because of a lack of information among doctors from related specialties, especially family doctors, leading to detection in our country at advanced stages and in the phase when the disease has visceralized (5). Sleep fragmentation and sleep deprivation that cause daytime sleepiness negatively affect breath control, decreasing the ventilatory response to hypoxemia and hypercapnia. The cardio-

vascular system's response is important and may influence the effects of therapy in these patients (6). Behavioral changes include general recommendations such as: weight loss, regular exercise, positional therapy for OSAS, avoiding the consumption of substances before sleep: alcohol, sedatives, etc. (7). CPAP has a beneficial effect on the severity of OSAS: decreases Apnea-Hypopnea Index (AHI) and improves the quality of life, the diurnal symptomatology of OSAS, has a beneficial effect on improving cognition and on the cardiovascular comorbidities (8). It is used indefinitely, generally for the entire life of the patient, so it is necessary that the patient be adherent in order for him to feel the benefits (9). Adherence in the first period of time may have statistical significance for long-term adherence. The aim of the present study is to determine whether there is a link between patient tolerance to CPAP therapy in the first period,

adherence during that period, and adherence in the following months of therapy.

Materials and Methods

Study design

This retrospective cohort study included 86 patients diagnosed with OSAS, divided into two categories: CPAP adherent patients ($n = 50$) and non-adherent patients ($n = 36$). The period of patient inclusion in the study was between 2024 and 2025.

The inclusion criteria were as follows: signed informed consent, age over 18 years, eligible for CPAP therapy, not previously using CPAP, and for whom other therapeutic methods are not recommended. The exclusion criteria were: lack of informed consent, age under 18 years, pregnant women, those who have used CPAP in the past, lack of access to a telephone network, and associated severe comorbidities.

Adherence was objectively determined from analysis of CPAP therapy compliance card data: patients using at least 4 h/night were considered adherent on at least 70% of recommended days. The patients were evaluated over a period of 3 months as follows: T0: After the first night of therapy, the data were downloaded from the CPAP device's memory card to analyze therapy adherence. T2: After the first week of therapy, data were downloaded from the memory card of the CPAP device to analyze adherence to therapy. T3: Final adherence assessment (3 months): data were downloaded from the memory card of the CPAP device to analyze adherence to therapy, and patients completed a questionnaire that analyzed the factors involved in adherence to therapy and the causes for its suboptimal use (below 4 h/night in 70% of the recommended days).

The study was approved by the Ethical Council of the Rosiori de Vede Pneumology Hospital (Ethical Approval: No. 1/2024). *Study setting*

The study was monocentric and conducted at a pneumology hospital. On the first night, nocturnal cardio-respiratory polygraphy was performed, and on the second night, the CPAP device was titrated. Titration of the CPAP device was performed using a

portable polygraph and an Auto-CPAP. The type of mask used (nasal or oro-nasal) is determined by the patient's breathing pattern. Also, the CPAP mask size is determined by the patient's face. Patients were evaluated at regular intervals *via* telephone appointments and received information on the diagnosis of OSAS, its causes, treatment modalities, and the consequences of not using it. The questionnaire included self-administered Yes/No questions about the patient's comfort after using CPAP therapy, sleep quality, and whether side effects were reported. Adherence to therapy consisted of using CPAP therapy for at least 4 hours/night in at least 70% of the recommended number of days.

Statistical analysis

For statistical processing of the study data, IBM SPSS Statistics for Windows, Version 29.0, was used. The Chi-square test was used to assess whether there is a significant association between two categorical variables. The independent samples t-test was used to compare the means of two independent groups. The Mann-Whitney test is a non-parametric test used to compare two independent groups when the data are not normally distributed. For interpreting the statistical significance of the results, a p -value < 0.05 was considered significant. P -values below this threshold were interpreted as indicating a statistically significant association between the variables analysed.

Results and Discussion

The age distribution differed slightly between the two study groups. The non-adherent group ($n = 36$) had a mean age of 55.22 years, with a standard deviation of 9.141 years. The adherent group ($n = 50$) was marginally older, with a mean age of 58.22 years and a standard deviation of 9.530 years. Overall, adherent patients exhibited a modestly higher average age compared with non-adherent patients, while variability in age was comparable between groups.

In both groups, male patients predominate, with no notable difference between the two categories (72.2% men among non-adherents *versus* 70.0% among adherents) (Table I).

Table I

Descriptive statistics of study groups-Gender

Descriptive statistics-Gender					
			Gender		Total
			Male	Female	
Adherent/ Non-adherent	Non-adherent	Frequency	26	10	36
		%	72.2%	27.8%	100.0%
	Adherent	Frequency	35	15	50
		%	70.0%	30.0%	100.0%
Total		Frequency	61	25	86
		%	70.9%	29.1%	100.0%

Table II

Adherence of the patients on the first night with CPAP

Adherence of the patients on the first night					
Adherent/Non-adherent * First night of CPAP use					
			First night of CPAP use – good adherence		Total
			No	Yes	
Adherent/ Non-adherent	Non-adherent	Frequency	22	14	36
		%	61.1%	38.9%	100.0%
	Adherent	Frequency	5	45	50
		%	10.0%	90.0%	100.0%
Total		Frequency	27	59	86
		%	31.4%	68.6%	100.0%

First night of CPAP use

The analysis of the first night of CPAP use indicates a significant difference between adherent and non-adherent patient groups. At the descriptive level, 38.9% of non-adherents had good adherence from the first night, while 90.0% of adherents reported a positive experience with first use (Table II). Thus, most of those who continued treatment had a favorable initial adaptation, in contrast to those who abandoned the use of the device.

A chi-square test for comparison revealed a statistically significant difference between the two groups in this aspect ($\chi^2(1) = 25.386$, $p < 0.001$), with a strong association (Cramer's $V = 0.543$). These results suggest that the first experience with

CPAP therapy is an important predictor of subsequent treatment adherence. Comfortable, effective use from the first night is associated with a higher likelihood of maintaining long-term therapy.

First week of CPAP use

The experience analysis from the first week of CPAP use reveals clear differences between adherent and non-adherent patients. Among non-adherents, only 41.7% reported good adherence in the first week, compared with a significantly higher percentage - 98.0% - among adherent patients (Table III). Thus, the vast majority of those who continued long-term treatment had a positive experience from the very first days.

Table III

Adherence of the patients on the first week with CPAP

Adherent/Non-adherent * First week of CPAP use					
			First week of CPAP use-good adherence		Total
			No	Yes	
Adherent/ Non-adherent	Non-adherent	Frequency	21	15	36
		%	58.3%	41.7%	100.0%
	Adherent	Frequency	1	49	50
		%	2.0%	98.0%	100.0%
Total		Frequency	22	64	86
		%	25.6%	74.4%	100.0%

The chi-square test confirmed a statistically significant difference between the two groups ($\chi^2(1) = 34.890$, $p < 0.001$), and the value of the Cramer's V coefficient (0.637) indicates a very strong association between positive perception of therapy in the first week and subsequent adherence to CPAP treatment. The results underscore that the first week of CPAP use is crucial for determining compliance behavior and for patient adaptation and therapy success.

Multiple factors contribute to the adherence of patients with OSAS to CPAP therapy.

This study examines patient adherence to CPAP therapy in OSAS and the role of initial adherence in subsequent adherence.

In the current study, self-titration was used to set the CPAP device pressure. In a study of 40 patients who reported their satisfaction on the night of CPAP titration and completed a questionnaire, it was found

that the titration method (manual or self-titration) did not influence patient satisfaction with the therapy (10).

In our study, the first period of therapy positively influenced future adherence. Thus, adherent patients had higher levels of adherence and comfort with therapy than non-adherent patients during this period. A. S. Almeneessier, in the prospective observational study involving 101 patients with obesity-hypoventilation syndrome and severe OSAS ($AHI > 30$), had CPAP adherence of 43% at 1 year of therapy. The main factor associated with CPAP adherence was adherence during the first period of therapy use (at 1 month and 6 months) (11).

Qiao *et al.*, in a study involving 222 patients, showed that the main factors associated with CPAP adherence at the 12-month follow-up in patients with mild OSAS (AHI 5-15 events/hour of sleep) were: older age, lower BMI, existence of a life partner,

non-smoking status, Diabetes Mellitus, Cardiac Insufficiency, absence of diagnosis of Depression, and good adherence at 1, 3, 6, 9 months of CPAP (12).

The first night of therapy, the patient's initial contact with the CPAP device that will be used indefinitely, may significantly affect long-term adherence. In our study, during the first night of therapy (titration night), 90% of adherent patients demonstrated good adherence, whereas only 38% of non-adherent patients did. Therefore, early adaptation to CPAP therapy appears to be essential for subsequent long-term adherence (Table II). In our study, therapy adherence was objectively assessed using data from CPAP memory cards.

In the study by Bikov *et al.*, the main predictors of adherence were driver status and adherence during the early period of CPAP therapy (13). In the study by van Zeller *et al.*, which included 88 patients, the main predictors of long-term adherence were age and initial adherence to therapy (14).

In the current study, which included 86 patients, most reported improvement in symptoms under therapy, even among non-adherent patients; suboptimal use of therapy had important benefits. In a study involving 76 patients, the effect of CPAP therapy on the daytime and nocturnal symptoms of patients was stable during the first period of therapy use (first 3 months), which is important for optimal use of therapy (minimum 4 h/night) and significantly better with increased use of therapy (more than 6 h/night) (15). In a prospective cohort study involving 62 patients, the attitude that patients had during the first period of CPAP therapy (assessed on the basis of a questionnaire) was relevant to subsequent adherence to therapy, so management of side effects and discomfort experienced by the patient during this period may be relevant to therapy compliance (16). In a study involving 44 patients, after the titration night of CPAP therapy, patients receiving CPAP therapy to treat OSAS felt more rested than those not receiving therapy; psychomotor vigilance tests were also significantly better in patients using the therapy compared to others (17).

We used a yes-or-no questionnaire to assess the patient's level of comfort and side effects; how they feel during the first period of therapy will influence future adherence.

In a retrospective study involving the administration of a 6-item questionnaire to patients with OSAS after titration night, the answers to these questions were predictive of subsequent adherence to therapy (18).

In the present study, 98% of adherent patients had good compliance during the first week of therapy; this percentage is higher than in the first night of therapy in adherent patients (90%), suggesting that the benefits experienced by this group of patients resulted in an increase in the use of therapy (Table

III). Among non-adherent patients, the proportion with good therapy adherence within one week of initiation remained low (41%), suggesting a low rate of therapy use in this patient group (Table III). In a retrospective study of 100 patients, objective assessment by downloading data from the CPAP compliance card during the first 3 days of therapy was predictive of adherence over 30 days of therapy (minimum 4 h/night); adherence was also directly proportional to the patient's age (19). In a study involving 88 patients, there was a negative association between patient age, adherence at 12 days and 6 months of therapy, and objectively measured adherence at 5 years of therapy, with adherence predicting abandonment of therapy (14).

In our study, after the titration night, most patients, both adherent and non-adherent, experienced symptom improvement. In a prospective study of 71 patients followed for 47 days, the main factor associated with good adherence to therapy was sleep efficiency at titration night, independent of OSAS severity (AHI); patients with better therapy adherence also showed a greater improvement in sleep efficiency (20).

Even the suboptimal use of therapy had beneficial effects in the present study. In a study of 51 patients, there was a significant long-term improvement in symptoms among those with OSAS who initially had suboptimal adherence to therapy (21). In a study involving 1.000 patients, adhesion levels during the first month explained 86% of adhesion levels at 3 months of therapy (22).

Many factors can be predictive of adherence of patients with OSAS to CPAP therapy. The present study brought into discussion the role that the first period of therapy, of getting used to the device, with the CPAP mask, of management of side effects in therapy, the benefits felt by the patient during this period may have on the way the patient will use the therapy in the future.

During the study, patients received information about the severity of the disease, CPAP therapy, and the management of side effects, and were encouraged to seek advice from the attending physician as often as needed. In a study involving 202 patients, the application of an educational programme during the first period of CPAP therapy had a positive effect on adherence, but this effect was lost over time, suggesting a need for repetition at set intervals (23). In the study by Smith *et al.*, a strategy that included patient education and music therapy significantly improved patient adherence at one month (24). In a randomized controlled trial by Bakker *et al.* involving 83 patients, the use of motivational therapy during routine follow-up visits and telephone contacts increased adherence to CPAP therapy (25). In a study involving 230 patients, divided into two groups (standard and intensive

monitoring) and followed for one year, it was found that more intensive monitoring during the first period of therapy did not yield a significant benefit for therapy compliance or clinical symptomatology (26). In a study of 194 patients, the level of adherence at the first post-start CPAP therapy visit was most predictive of subsequent adherence (27). This retrospective observational study demonstrates a significant link between adherence during the first period of CPAP therapy in patients with OSAS and long-term adherence.

Conclusions

A multitude of factors are involved in the adherence of patients with OSAS to CPAP therapy. The early phase of treatment, particularly how patients tolerate and adapt to therapy, appears to play a crucial role in long-term use. Adequate support during this critical period, including timely management of side effects and proactive identification and resolution of therapy-related difficulties, may be essential for achieving sustained long-term adherence.

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Availability of data and materials

The data generated in the present study are included in the figures and/or tables of this article. The other data generated in the present study may be requested from the corresponding author.

Ethics approval and consent to participate

The study was approved by the Ethical Council of the Rosiori de Vede Pneumology Hospital (Ethical Approval: No. 1/2024)

AI use disclosure

Not applicable.

Conflict of interest

The authors declare no conflict of interest.

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