

The Role of Self-Esteem in the Adherence of Patients with Obstructive Sleep Apnea Syndrome to Continuous Positive Airway Pressure Therapy

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ABSTRACT

Introduction: Continuous positive airway pressure therapy (CPAP) is the gold standard for the treatment of obstructive sleep apnea syndrome (OSAS). This therapy eliminates daytime sleepiness and prevents cardiovascular complications of OSAS. Given that CPAP is a chronic therapy and that in most cases it must be used for life, good adherence to treatment is essential for the patient to feel its benefits. Psychological factors play an important role in the compliance of OSAS patients with CPAP therapy. Self-esteem (SE) can be defined as a person's positive or negative attitude toward the self in totality.

Materials and methods: We conducted a prospective, observational, non-randomized study on an essay of 380 observations with 95 patients. After the evaluation period, based on the average time of CPAP used, the patients were divided into two groups: a first group consisting of 50 patients who were considered adherent to the instituted therapy and a second group comprising 45 patients who were considered non-adherent to the instituted therapy. The aim of this article is to assess the role of self-esteem in the adherence of patients with OSAS to CPAP therapy. Determinants of self-esteem at the beginning of treatment (To) were evaluated. The secondary objectives of the study consisted of investigating the existence of other predictors for the evolution of OSA such as self-esteem and clinical/demographic/paraclinical parameters.

Results: In the present study, the adherence of patients with OSAS to CPAP therapy was 52.63%. The self-esteem score was higher in adherent patients than non-adherent ones. The main factors associated with increased self-esteem levels included good adherence to therapy, education, patient income, absence of alcohol and tobacco consumption, absence of nocturnal symptoms, use of Auto-CPAP, use of nasal mask, absence of other pulmonary pathology, absence of psychological type D.

Conclusions: Psychological factors play an important role in the compliance of OSAS patients with CPAP therapy. Along with other factors, self-esteem may be one of the predictive factors for patients' adherence to CPAP therapy.

Keywords: apnea, adherence, CPAP, predictive factors, self-esteem.

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INTRODUCTION

Sleep is a dynamic process that involves complex neural activity (1).

About one billion of the world's 8.2 billion people are estimated to suffer from obstructive sleep apnea syndrome (OSAS), which is the most common form of sleep-related breathing disorders (2). Major global changes in the proportion of obese patients, both adults and children, as well as the ageing of the population, make OSAS one of the important contributors to the quality of the population's health in the future (3).

The last two decades have witnessed an increasingly evident relationship between OSAS and road accidents, with the latter occurring 2-7 times more often in OSAS patients than in the general population (4, 5).

The treatment of OSAS begins with identifying aggravating factors and resolving them (6). The management of OSAS should meet three main objectives: symptom relief, decreased mortality and decreased morbidity (7).

Continuous positive airway pressure therapy (CPAP) is the gold standard for the treatment of OSAS, and when it is effective, it decreases the apnea-hypopnea index and hypoxemia (8). This therapy eliminates daytime sleepiness and prevents cardiovascular complications of OSAS. Decreasing or completely eliminating upper airway collapse with therapy will minimize sleep fragmentation and nocturnal hypoxemia (9).

Given that CPAP is a chronic therapy and that in most cases it must be used for life, good adherence to treatment is essential for the patient to feel its benefits (10).

Psychological factors play an important role in the adherence of patients with OSAS with CPAP therapy. Thus, expectations and perceptions regarding CPAP therapy may differ between adherent and non-adherent patients at the level of perception of OSAS risk, recognition of symptoms, one's own effectiveness in activity, expectations related to treatment, achievement of therapy goals and barriers and facilities regarding therapy (11).

Self-esteem (SE) can be defined as a person's positive or negative attitude toward the self in totality (12). Rosenberg's scale was developed to describe, compare and predict self-esteem and evaluate changes in self-esteem due to interven-

tions (13). Type D personality represents a psychological type with a joint tendency toward negative affectivity and social inhibition-is related to poor cardiac prognosis (14). □

MATERIALS AND METHODS

We conducted a prospective, observational, non-randomized study on an essay of 380 observations with 95 observational units (95 patients who were diagnosed with OSA, with a part of the tracked variables being measured at four time points: I=moment of diagnosis; II=one month; III=six months; and IV=12 months).

Adherence to therapy implies the use of CPAP in at least 70% of the recommended number of days at least four hours per night.

Patients were divided into two groups. The first one consisted of 50 patients who were considered adherent to the instituted therapy and the second group comprised 45 patients who were considered non-adherent to the instituted therapy.

Nocturnal polygraphy was performed with the Miniscreen or Löwenstein portable polygraph and CPAP titration with Miniscreen or Löwenstein portable polygraph and Auto-CPAP Löwenstein. The severity of OSAS was determined by the apnea-hypopnea index (AHI). Apnea and hypopnea were analysed according to the American Academy of Sleep Medicine guidelines, with apnea being defined as the absence of airflow for at least 10 seconds and hypopnea as a reduction in airflow by 30% associated with an oxyhaemoglobin desaturation of at least 3%.

The Rosenberg scale includes a number of 10 questions to identify the patient's respect for himself. For each statement, the subject was invited to express agreement, full agreement, disagreement and full disagreement. Each answer was given a score from 0 to 3. A score below 30 identifies a medium and low level of self-esteem, while a score above 30 corresponds to a high level of self-esteem.

Statistical analysis

For statistical analysis, the R program, version 4.4.0 Copyright (C) 2024 The R Foundation for Statistical Computing, R Core Team (2024) was used. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna,

Austria URL <https://www.R-project.org>. The following additional packages have been used: gtsummary, lme4, lmerTest and sjPlot.

The alpha significance level in the study was 0.05, with p-values lower than 0.05 being considered statistically significant. $\square$

TABLE 1. Difference between Rosenberg score adherent and non-adherent patients

Variable	Global N=95	Non-adherent patients N=45	Adherent patients N=50	P value
Initial Rosenberg score, mean (SD)	26.51 (5.48)	22.98 (4.36)	29.68 (4.34)	<0.001

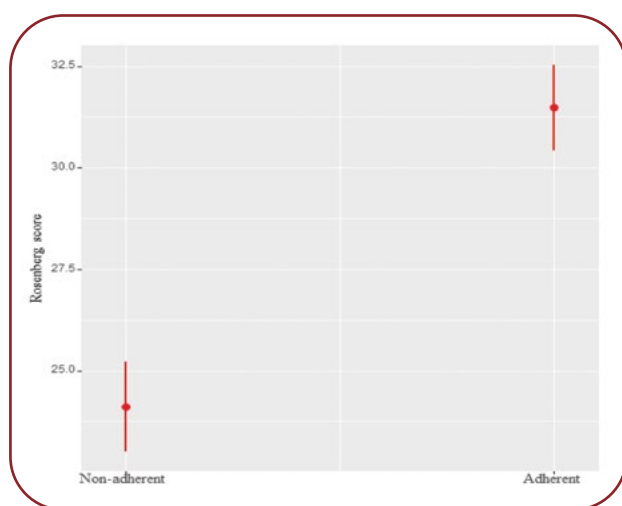


FIGURE 1. Association between Rosenberg score and adherence to therapy over the course of the study

TABLE 2. Association between Rosenberg score and predictive factors for adherence (1)

Predictive factor	N	Beta (95% CI) ^I	P value
Age	380	0.08 (-0.03 to 0.19)	0.152
Gender			
F	140	—	
M	240	0.72 (-1.5 to 3.0)	0.522
Place of residence			
R	220	—	
U	160	0.33 (-1.9 to 2.5)	0.767
Level of education			
Middle school degree and below	20	—	
High school degree	292	4.8 (0.13 to 9.4)	0.044
Bachelor degree and above	68	7.6 (2.5 to 13)	0.004
Lives with someone			
YES	304	—	
NO	76	-0.84 (-2.9 to 1.2)	0.411
Monthly family income (RON)	380	0.24 (0.17 to 0.32)	<0.001
Cost of medicines/other therapies than CPAP	380	0.02 (0.01 to 0.03)	0.001

^ICI = confidence interval

RESULTS

Patients were divided into two groups, according to their adherence to therapy (at least 70% of the recommended days, four hours/night): group 1 with 50 patients considered adherent (52.63%) and group 2 with 45 patients considered non-adherent (47.36%).

The average baseline Rosenberg score of adherent patients was almost seven points higher than that of non-adherent subjects (Table 1).

Over the course of the study, the mean Rosenberg score was higher in adherent patients than in non-adherent ones (Figure 1).

Regarding the level of education, compared to patients with middle school degree and below, the Rosenberg score was on average 4.8 points higher in patients with high school degree and 7.6 points higher in those with bachelor degree and above (Table 2).

An increase of 100 RON in income was associated with an average increase of 0.24 points

TABLE 3. Association between Rosenberg score and predictive factors for adherence (2)

Predictive factor	N	Beta (95% CI) ^I	P value
With air humidifier			
YES	72	—	
NO	308	-2.8 (-3.7 to -2.0)	<0.001
BMI	380	-0.37 (-0.53 to -0.21)	<0.001
Systolic blood pressure	380	-0.08 (-0.10 to -0.06)	<0.001
Diastolic blood pressure	380	-0.04 (-0.07 to 0.00)	0.028
Heart rate	380	-0.06 (-0.09 to -0.02)	<0.001
Mallampati score	380	-0.95 (-2.2 to 0.34)	0.147
Alcohol			
YES	50	—	
NO	330	1.6 (0.11 to 3.1)	0.035
Smoking			
YES	65	—	
NO	315	2.4 (0.15 to 4.7)	0.037
Nocturnal dyspnea			
YES	55	—	
NO	325	2.5 (1.6 to 3.4)	<0.001
Snoring			
YES	130	—	
NO	250	2.5 (2.0 to 3.0)	<0.001
Nocturia			
YES	65	—	
NO	315	1.3 (0.03 to 2.5)	0.045
Frequent nocturnal awakenings			
YES	49	—	
NO	331	2.0 (0.86 to 3.1)	<0.001

^ICI=confidence interval

TABLE 4. Association between Rosenberg score and predictive factors for adherence (3)

Predictive factor	N	Beta (95% CI) ¹	P value
Epworth score	380	-0.21 (-0.25 to -0.16)	<0.001
AHI	380	-0.01 (-0.06 to 0.05)	0.731
Desaturation index	380	0.00 (-0.05 to 0.05)	0.929
Number of minutes with O ₂ saturation below 90%	380	0.03 (-0.01 to 0.07)	0.107
Auto CPAP			
YES	138	—	
NO	242	-1.6 (-2.4 to -0.84)	<0.001
CPAP in fixed pressure			
YES	150	—	
NO	230	-2.1 (-2.8 to -1.4)	<0.001
CPAP nasal mask			
YES	36	—	
NO	344	-2.0 (-3.5 to -0.53)	0.008
CPAP oro-nasal mask			
YES	249	—	
NO	131	-1.9 (-2.5 to -1.4)	<0.001
CPAP pressure	379	0.18 (0.13 to 0.22)	<0.001

¹CI=confidence interval**TABLE 5.** Association between Rosenberg score and predictive factors for adherence (4)

Predictive factor	N	Beta (95% CI) ¹	P value
Diabetes mellitus			
YES	72	—	
NO	308	-0.13 (-2.9 to 2.6)	0.926
Endocrine diseases			
YES	20	—	
NO	360	3.1 (-1.7 to 7.9)	0.210
Lung diseases			
YES	112	—	
NO	268	2.4 (0.04 to 4.7)	0.047
Gastroesophageal reflux disease			
YES	12	—	
NO	368	2.5 (-3.7 to 8.6)	0.424
Neurological diseases			
YES	20	—	
NO	360	-0.85 (-5.7 to 4.0)	0.727
ENT diseases			
YES	32	—	
NO	348	-2.0 (-5.8 to 1.9)	0.319
Psychiatric diseases			
YES	32	—	
NO	348	0.03 (-3.9 to 3.9)	0.990
Type D personality			
YES	144	—	
NO	236	5.8 (3.9 to 7.7)	<0.001

¹CI=confidence interval

in the Rosenberg score, while a 10 RON increase in the cost of medicines/other therapies than CPAP was associated with an average increase of 0.02 points in the Rosenberg score (Table 3).

In patients who did not use an air humidifier, the Rosenberg score was, on average, 2.8 points lower (Table 3).

A 0.1 kg increase in BMI was associated with an average 0.37-point decrease in the Rosenberg score (Table 3).

A 10 mm Hg increase in systolic blood pressure was associated with a mean 0.08-point decrease in the Rosenberg score. A 10 mm Hg increase in diastolic blood pressure was associated with a mean 0.04-point decrease in the Rosenberg score.

An increase of 1 in heart rate was associated with an average decrease of 0.06 points in the Rosenberg score (Table 3).

The Rosenberg score was on average 1.6 points higher in patients who did not consume alcohol and 2.4 points higher in those who did not smoke (Table 3).

The Rosenberg score was on average 2.5 points higher in patients without nocturnal dyspnea as well as in those without snoring (Table 3).

The Rosenberg score was on average 1.3 points higher in patients without nocturia and 2.0 points higher in those without frequent nocturnal awakenings (Table 3).

A one-point increase in the Epworth score was associated with an average 0.21-point decrease in the Rosenberg score (Table 4).

In patients without Auto-CPAP, the Rosenberg score was on average 1.6 points lower, while in those without CPAP in fixed pressure, it was on average 2.1 points lower (Table 4).

The Rosenberg score was on average two points lower in patients without nasal mask and 1.9 points lower in those without oro-nasal mask (Table 4).

A one-point increase in CPAP pressure was associated with an average 0.18-point increase in the Rosenberg score (Table 4).

In patients without lung disease, the Rosenberg score was on average 2.4 points higher (Table 5).

In patients who did not have type D personality, the Rosenberg score was on average 5.8 points higher (Table 5). ■

DISCUSSIONS

Obstructive sleep apnea syndrome is an underdiagnosed pathology in Romania.

In the present study, the adherence of patients with OSAS to CPAP therapy was 52.63%.

In a descriptive study involving 12,538 patients (51% women), only 37% of subjects adhered to CPAP therapy (minimum four hours/night in > 70% of the recommended number of days). The level of adherence was similar between the sexes and it improved with age (15).

In our study, the self-esteem score was higher in adherent patients than non-adherent ones (Figure 1).

In our study, patients with a higher level of sleepiness (a higher Epworth score) had lower levels of self-esteem (Table 4).

The level of self-esteem was higher in patients with a high level of education (Table 2). Most patients with a high level of education were in the group of adherent subjects. Thus, in a study involving 6000 patients, F S Fuchs *et al* demonstrated that education was playing a significant role in CPAP therapy even after a long period of time (16).

The level of self-esteem was higher in patients with a higher income (Table 2), similarly to another study where the likelihood of greater self-esteem and life satisfaction increased with income, while the probability of having poor self-esteem and life satisfaction increased as income decreased (17).

Patients who did not consume alcohol and tobacco had a higher level of self-esteem compared to those who did (Table 3). In one study, e-cigarette users reported higher stress levels than non-users, but self-esteem levels were comparable (18).

Patients without OSAS nocturnal symptoms (nocturnal dyspnea, snoring, nocturia, frequent nocturnal awakenings) had a higher Rosenberg score (higher self-esteem) (Table 3). In a retrospective study involving 3046 patients, M A Al-Abri *et al* demonstrated that CPAP compliant subjects had a higher degree of disease severity (higher apnea-hypopnea index and desaturation index) compared to non-compliant ones. This result was not similar for other factors such as age, gender, daytime sleepiness and presence of comorbidities (19). In another study, women's reduced health-related quality of life (HRQOL), particularly in self-esteem, sexual life and physical functioning, and their greater rates of depression might play a role in their decision to seek bariatric surgery (20).

Patients who used CPAP in fixed pressure, but not Auto-CPAP, had a lower Rosenberg score

(Table 4). In a prospective randomized trial involving 10 patients, S F Hussain *et al* showed that the Auto-CPAP therapy variant was as effective in treating OSAS as the fixed-pressure CPAP variant but it was also associated with fewer side effects, better adherence to therapy, increased patient satisfaction or preference for this type of therapy (21).

In subjects who did not use the nasal mask (they used the oro-nasal mask), the Rosenberg score was lower (Table 4). In a prospective randomized study involving 48 patients, S Rowland *et al* reported that adherence to CPAP therapy was no different in the three types of masks (nasal, oro-nasal and nasal with chin support mechanism). However, the comparison between the oro-nasal mask with the nasal one revealed a lower reporting of side effects, better comfort, better sleep and a more frequent choice of nasal mask (22).

A higher self-esteem score has been associated with tolerance of higher CPAP pressure (Table 4).

Patients who did not have OSAS-associated lung disease had a higher self-esteem score than the other subjects. In a study by M-C L Machado *et al*, CPAP treatment was associated with better survival in patients with moderate and severe OSA and those who associated COPD and respiratory failure with long-term oxygen therapy at home (23). In one study, rheumatoid arthritis patients with higher self-esteem and higher positive affect had higher levels of therapeutic compliance (24). An analytical descriptive study found a positive correlation between self-esteem and adherence to drug therapy (25).

In another study, there was a significant positive correlation between participants' medication adherence and psychosocial adjustment to body weight, image and self-esteem (26).

Our study found a lower Rosenberg score in patients with type D personality (Table 5).

In a cross-sectional retrospective study, there was no link between self-confidence and adherence to therapy in patients with low adherence. However, in those with increased adherence, there was a significantly positive link between them (27).

An observational study found that, 12 months following CPAP therapy, there was an improvement in depressive symptoms, daytime sleepiness, emotional regulation and emotional reactivity, but without a dose-effect relationship

(those who used CPAP below four hours/night had the same improvement as those who used it more than four hours/night) (28).

In a study that looked at the association of self-esteem with other deafness-related variables, the major sociodemographic factor that explained self-esteem was marital/partnership status (being in a relationship was helpful); also, subjects with higher levels of education and those working or studying had higher self-esteem than those who did not (29).

In one study, adherent CPAP improved erectile function, sexual desire, overall sexual, self-esteem, relationship and treatment satisfaction, as well as sleepiness and quality of life (30).

Study limitations

The limitations of the present study were the relatively small number of patients enrolled in the study as well as the fact that it was a single centre study. However, the results are consistent with those of previous studies that identified multiple factors involved in CPAP adherence. □

CONCLUSION

The adherence of patients with OSAS to CPAP therapy can be influenced by many factors. Among these, psychological factors can play an important role. Better adherence to therapy, awareness of the benefits of therapy and a favourable evolution of patients can also be associated with a higher level of self-esteem. □

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Informed consent: has been obtained from all individuals included in this study.

Ethical approval: Research involving human subjects is in accordance with the tenets of the Helsinki Declaration (as amended in 2013).

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