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The Influence of the Treatment of Obstructive Sleep Apnea Syndrome on Depression, Anxiety, and Quality of Life

Obstrüktif Uyku Apne Sendromunun Tedavisinin Depresyon, Anksiyete ve Yaşam Kalitesi Üzerine Etkileri

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Summary

Introduction: Psychiatric diseases may co-exist with obstructive sleep apnea syndrome (OSAS). We examined the presence of this comorbidity on the quality of life and sexual life, and the beneficial effects of OSAS treatment.

Materials and Methods: A total of 79 consecutive patients newly admitted to the Sleep Disorders Unit were investigated with a psychiatric interview and whole-night polysomnography. DSM-IV-TR criteria were used and the Beck Depression and Anxiety Scales (BDS and BAS), the 36-item Short Form health survey (SF-36), and the Arizona Sexual Experiences Scale (ASEX) were administered. After one month of treatment with non-invasive mechanical ventilation, all investigations were repeated.

Results: Of 48 patients with OSAS, major depression was present in 13 patients (27%), anxiety disorders in 3 patients (6.2%), and major depression and anxiety disorders were both present in 11 patients (22.9%). Following one month of OSAS treatment, major depression was observed in 5 patients (10.4%), anxiety disorder in 1 patient (2.0%), and both major depression and anxiety disorder (p=0.001) were found in 9 patients (18.7%). After treatment, significant improvements were detected in both BDS (p=0.001) and BAS scores (p=0.002). There was no significant difference in ASEX scores (p=0.165). Comparison of SF36 sub-scales scores before and after OSAS treatment demonstrated significant improvements in quality of life measures. The significance was more pronounced in patients with severe OSAS.

Discussion: It is of great importance to keep in mind the comorbidity of OSAS and psychiatric diseases such as drug resistant depression and anxiety disorders, as treatment of OSAS provides a marked benefit in depression, anxiety, and also in quality of life. (*JTSM 2014;2:51-7)*

Key Words: Obstructive sleep apnea syndrome, major depression, anxiety disorder, treatment

Özet

Giriş: Psikiyatrik hastalıklar obstrüktif uyku apne sendromu (OUAS) ile birliktelik gösterebilmektedirler. Çalışmamızda, bu birlikteliğin hastaların yaşam kalitesi ve cinsel fonksiyonları üzerine olan etkileri ile OUAS tedavisinin yararlarını araştırdık.

Gereç ve Yöntem: Uyku Bozuklukları birimine başvuran ve tüm gece polisomnografi tetkiki yapılan ardışık 79 hasta bire-bir psikiyatrik görüşme ile değerlendirildi. DSM-4-TR kriterleri, Beck Depresyon ve Anksiyete skalaları (BDS ve BAS), yaşam kalitesi için Kısa Form (SF-36) ve Arizona Cinsel Fonksiyonlar Skalası uygulandı. Bir ay süre ile OUAS tedavisi sonrasında hastalar tekrar değerlendirildi.

Bulgular: OUAS tanısı alan 48 hastanın 13'ünde (%27) major depresyon, üçünde (%6,2) anksiyete bozukluğu ve 11'inde (%22,9) hem depresyon hem de anksiyete bozukluğu mevcuttu. Bir aylık OUAS tedavisi sonrasında ise beş hastada (%10,4) major depresyon, bir hastada (%2,0) anksiyete bozukluğu ve 9 hastada (%18,7) hem depresyon hem de anksiyete bozukluğu mevcuttu (p=0,001). Tedavi sonrasında BDS (p=0,001) ve BAS (p=0,002) ölçeklerinde anlamlı düzelme izlendi. Ancak Arizona Cinsel Fonksiyonlar Skalasında anlamlı değişiklik saptanmadı (p=0,165). SF36 alt gruplarının karşılaştırılması OUAS tedavisi sonrasında yaşam kalitesi ölçeklerinde anlamlı düzelme olduğunu gösterdi. Anlamlı düzelme ileri düzeyde OUAS olan hastalarda daha belirgindi.

Sonuç: Obstrüktif uyku apne sendromunun özellikle tedaviye dirençli depresyon ve anksiyete bozukluğu gibi psikiyatrik hastalıklar ile birlikte görülebileceği akılda tutulmalıdır; nitekim, OUAS tedavisi ile gerek depresyon ve anksiyete bozukluğunun gerekse yaşam kalitesinin düzeldiği görülmektedir. (*JTSM 2014;2:51-7)*

Anahtar Kelimeler: Obstrüktif uyku apne sendromu, major depresyon, anksiyete bozukluğu, tedavi

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Introduction

Obstructive sleep apnea syndrome (OSAS) is a common sleep disorder affecting 1%-5% of general population, regardless of age, race-ethnicity, and socioeconomic status. The most frequent complaints of admission to sleep disorder clinics are snoring, witnessed apnea, non-restorative sleep, morning headache, excessive daytime sleepiness, frequent night-time awakenings, decreased daytime performance, and poor concentration- which is also a frequent cause of traffic accidents (1,2). Non-invasive mechanical ventilation is proved to be the gold standard treatment of OSAS, which completely ameliorates the night and day time symptoms of OSAS (3).

Depression and anxiety are the most commonly encountered psychiatric disorders, with an increased prevalence in accordance with the increased frequency of chronic diseases. Lifetime prevalence of depression is 5%-12% for males and 10%-25% for females, while lifetime prevalence of anxiety disorders is reported approximately as 19% for general population. Depression may present itself with a sleep disturbance; on the contrary, chronic sleep disturbance can cause psychiatric problems, as well (4-7). It is also possible that psychiatric diseases may also co-exist with OSAS, which may lead an overlap of the symptoms of these disorders (4,8-12). It has been shown that comorbidity of OSAS with psychiatric disorders had a deleterious influence on the quality of life in these patients, and limited number of studies with OSAS treatment showed conflicting results whether the treatment of OSAS would reverse the negative influences of OSAS on psychiatric disorders (13-16). In addition, sexual functions are important component of the quality of life that could be negatively affected by chronic diseases (17-19). Although OSAS was shown to cause sexual dysfunction, (20) the effects of OSAS and its treatment is not known in patients with psychiatric comorbidities.

In this prospective study, we aimed to examine (i) the comorbidity of depression and anxiety disorder with OSAS, (ii) the effects of this comorbidity on the quality of life and sexual life, and (iii) the effect of regular treatment of OSAS with non-invasive mechanical ventilation for one month.

Materials and Methods

A total of seventy-nine consecutive patients newly admitted to Sleep Disorders Unit within one-year-period were investigated. Patients diagnosed to have OSAS upon a whole-night polysomnographic examination were included in to the study. A whole-night polysomnographic examination was carried out with three channel electroencephalography placed according to the international 10-20 system, right and left electrooculography, mental and bilateral tibial electromyography, electrocardiography, oro-nasal canulla and thermistor, thoracal and abdominal respiratory movements, pulse oxymetry, body position and video recording. All polysomnographic examinations were scored according to the AASM Manual for the Scoring of Sleep and Associated Events (21). Patients who were difficult to cooperate due to medical conditions such as delirium, dementia, psychosis or manic episode were excluded. In addition, patients diagnosed with other sleep related respiratory disorders as central sleep apnea syndrome were also excluded. The study was approved by the Clinical Research Ethics Committee.

All patients had a psychiatric interview by the same psychiatrist and evaluated for major depression and anxiety disorder based on DSM-IV-TR criteria. Beck Depression and Anxiety Scales (BDS and BAS) were used for the evaluation and measurement of symptoms related to depression and anxiety (higher the scores, more common the depressive and anxiety smptoms); the Short-Form Health Survey (SF-36) was used to evaluate quality of life (lower the scores, worse the quality of life); Arizona Sexual Experiences Scale was used for evaluation of sexual functions (higher the scores, worse the sexual functions); and Epworth Sleepiness Scale (ESS) was used to evaluate daytime sleepiness (higher the scores, higher the sleepiness).

After one month treatment with non-invasive mechanical ventilation (including CPAP [continuous positive airway pressure] and BPAP [bilateral positive airway pressure]), patients were called for the control psychiatric interview and clinical scales to be performed. For various reasons including intolerance or incomplicance to treatment or drop-outs from the follow-up visits, a total of forty-eight patients completed the study. All patients were on CPAP/BPAP therapy regularly every night and for at least 6 hours per night, and clinical evaluation demonstrated the efficiency of this treatment regarding OSAS symptomatology. No change was otherwise done, in terms of other treatments of patients for any other concomitant disease.

In statistical analysis, numerical variables were expressed as "mean ± standard deviation", and categorical variables were given as number and percentages. Mann-Whitney U test and Pearson chi-square test were used for comparisons of parametric and non-parametric data, accordingly. The comparisons of clinical scales before and after OSAS treatment were done by Wilcoxon Signed Ranks test. The threshold level for statistical significance was established at $p<0.05$. SPSS 16.0 for Windows package program was used to analyze the data.

Results

A total of 48 patients completed the study; 39 of them were males, and 9 were females. The mean age of patients was 48.2±7.6 years (ranging between 27 and 60). The education levels of patients were as follows: 13 of them (27.1%) were graduated from primary school, 7 (14.6%) from middle school, 9 (18.8%) from high school and 19 (39.6%) from a university. Forty-three patients (89.6%) were married and only 5 (10.4%) were single. Twelve of them (25%) were public servants, 11 (22.9%) were blue-collar worker, 3 (6.2%) were housewives, 15 (31.2%) had self-employment, 6 (12.5%) were retired, and only one patient (2.1%) was unemployed.

The patients were grouped in to two groups according to respiratory disturbance index (RDI) as patients with an RDI<30/hr and those with an RDI≥30/hr. According to this classification, 28 of 39 males and 4 out of 9 females had an RDI ≥30/hr. On the other hand, there was no statistically significant difference between RDI and genders ($p=0.138$), nor the mean of age of the patient groups ($p=0.196$). Yet, the mean body mass index of patients with an RDI>30/hr was higher than those having RDI<30/hr ($p=0.048$). Smoking, alcohol intake, or history of chronic diseases were not significantly different between patients with RDI<30/hr or RDI≥30/hr ($p=0.701$, $p=0.398$, and $p=0.765$, respectively). The presence of past psychiatric history, use of antidepressant medications and presence of current

stressor factors were also not different in two groups (Table 1). All patients were evaluated from psychiatric point of view according to DSM-4-TR criteria at admission and one month after CPAP/BPAP treatment. Major depression was detected in 13 patients (27%), anxiety disorders in 3 patients (6.2%), and co-existing major depression and anxiety disorders were present in 11 patients (22.9%) before OSAS treatment. There was no psychopathology in 21 patients (43.7%). Re-evaluation of patients following one month treatment of CPAP/BPAP therapy showed that 5 patients (10.4%) had major depression, 1 patient (2.0%) had anxiety disorder, and 9 patients (18.7%) had both major depression and anxiety disorder. Thirty-three patients (68.7%) had no psychiatric pathology. This difference in terms of psychiatric diagnoses before and after treatment was statistically significant (p=0.001).

The comparison of mean BDS, BAS and ESS scores before OSAS treatment were not different between two groups (patients with RDI<30/hr or RDI≥30/hr), while mean Arizona Sexual Experience Scale scores was significantly higher in patients with RDI< 30/hr than those having RDI >30/hr (16.1 points versus 13.2 points, p=0.039). SF36 sub-scale scores did not differ significantly between two groups, neither (Table 2). After one month treatment of CPAP/BPAP, significant improvements were detected in the mean scores of both BDS (p=0.001) and BAS (p=0.002). ESS scores were also significantly improved, showing the efficacy of treatment. There was no significant difference in Arizona Sexual Experience Scale scores after treatment in compared to pre-treatment values, though (p=0.165). Comparison of mean SF36 sub-scales before and after OSAS treatment demonstrated statistically significant improvements in all sub-scales except for Emotional Role Disability, as shown in (Table 3).

The evaluation of clinical scales before and after treatment in two RDI groups (<30/hr and ≥ 30/hr) is given in Table 4. The mean ESS scores were significantly decreased, and mean scores

Table 1. Comparison of patients according to respiratory disturbance index (RDI) and psychiatric history

Psychiatric history		**RDI<30/hr (n=16)**	**RDI≥30/hr (n=32)**	**p value***
Past psychiatric history	Present	7	10	0.524
	Absent	9	22	
Use of antidepressant medications	Present	5	6	0.468
	Absent	11	26	
Stressor factors	Present	2	4	1.000
	Absent	14	28	

*Pearson chi-square test

Table 2. Comparison of clinical scales in two groups (respiratory disturbance index, RDI<30/hr and RDI≥30/hr) before the treatment

Clinical Scales	**RDI<30/hr (n=16) (mean±sd)**	**RDI≥30/hr (n=32) (mean±sd)**	**p value***
Beck Depression Scale	11.6±12.1	13.6±10.2	0.293
Beck Anxiety Scale	15.3±13.6	13.4±10.4	0.913
Arizona Sexual Experience Scale	16.1±4.6	13.2±4.7	0.039
Epworth Sleepiness Scale	7.5±4.1	9.2±3.7	0.262
Short Form (SF) 36			
(1) Physical Function	61.8±27.5	71.8±25.9	0.211
(2) Physical Role Disabilities	62.5±47.4	58.5±44.2	0.628
(3) Pain	63.9±25.5	70.4±24.3	0.420
(4) General Health	51.8±22.5	54.9±24.6	0.685
(5) Vitality	58.7±31.5	55.9±25.0	0.606
(6) Social Function	67.9±28.4	66.3±29.3	0.859
(7) Emotional Role Disability	62.4±45.3	63.5±43.4	0.858
(8) Mental Health	63.5±22.4	57.5±26.1	0.430

*Mann-Whitney U test

of Physical Function, Pain and General Health sub-scales of SF36 were significantly increased in patients with RDI<30/hr. No significant change was detected regarding other scales (Table 4). In patients with RDI≥30/hr, on the other hand, significant decreases in mean scores of both BDS and BAS were present (p<0.001 and p=0.002 respectively). ESS was also significantly decreased after treatment (p<0.001). In SF36 scale, all but Physical Function (p=0.160) and Emotional Role Disability (p=0.401) were significantly increased (Table 4). However, there was no significant difference in Arizone Sexual Experience Scale after OSAS treatment (p=0.220).

We also analyzed the clinical scales depending on whether the patients had a psychiatric diagnosis (depression and/or anxiety disorder) or not. In patients with psychiatric diagnosis, significant change was observed in BDS (p=0.007), and BAS (p=0.040) scores. There was also significant change in ESS scores (p<0.001) and some of the SF36 subscales as Pain (p=0.002), General Health (p=0.010), Vitality (p=0.010), Social Function (p<0.001) and Mental Health (p=0.002). However, changes in Arizona Sexual Experience Scale scores were not significant (Table 5). In patients without psychiatric comorbidity, changes in mean scores of BDS (p=0.026), BAS (p=0.014), ESS (p<0.001), and two subscales of SF36 as Physical Function (p=0.032) and Pain (p=0.011) showed significant improvements, though other scales failed to reach the statistically significant level (Table 5).

Discussion

In the presented study, 27% of OSAS patients were diagnosed to have comorbid major depression, 6.2% of them had anxiety, and 22.9% had both anxiety and major depression comorbidity on the basis of DSM-IV-TR criteria. The comorbidity of OSAS and depression was reported as 7%-60% in the literature, and the comorbidity with anxiety disorder was reported between 11%-70% (4,8,11,12,15,22). The presence of depression and/or anxiety disorder seems much higher than general population; however as one might speculate, there is a wide range of changes in the frequency of comorbidity of OSAS and psychiatric disease, probably due to use of different scales instead of psychiatric interview. On the other hand, it is also difficult to determine the pathophysiological origin of overlapping symptoms of OSAS or depression and/or anxiety.

We observed that the mean scores of BDS, BAS, ESS and SF36 sub-scales were similar in patients with mild to moderate or severe OSAS before the treatment. The similar findings were also shown in two previous studies (23,24). On the other hand, there was no study evaluating the relationship between the severity of OSAS and Arizona Sexual Experience Scale in the literature, to our knowledge. In contrary to our initial hypothesis suggesting worsening in the quality of sexual life with increased severity of OSAS, we found that sexual life quality was significantly worse in the mild-moderate OSAS group compared to severe OSAS group. This may be related with cognitive or executive problems commonly encountered in OSAS patients to self-evaluate their symptoms; (8,25) however, it may also be a limitation of self–reporting scales, as used in our study. It was previously reported that the presence of OSAS comorbidity adversely affected female sexual functions; but no significant relation was shown between the severity of OSAS and sexual disturbances (26). On the other hand, although there was no relation between erectile dysfunction and severity of OSAS, CPAP treatment was shown to improve sexual functions (27). In our study, there was a trend towards better sexual functioning following one-month CPAP/BPAP treatment as analysed with Arizona Sexual Experience Scale, but not significant. The duration of the treatment may be too short to evaluate beneficial effects on sexual function. In addition, about 1/4-1/3 of the study population was under treatment with an antidepressant medication, which may have also contributed the erectile dysfunction and worse sexual functions in these patients.

Table 3. Clinical evaluation before and after treatment of obstructive sleep apnea syndrome for one month

Clinical scales	Before treatment (n=48) (mean±sd)	After treatment (n=48) (mean±sd)	p value*
Beck Depression Scale	13.0±10.8	8.5±8.4	0.001
Beck Anxiety Scale	14.0±11.4	10.6±12.3	0.002
Arizona Sexual Experience Scale	14.2±4.8	13.7±5.0	0.165
Epworth Sleepiness Scale	8.7±3.9	3.2±3.5	<0.001
Short Form (SF) 36			
(1) Physical Function	68.5±26.6	76.1±23.7	0.005
(2) Physical Role Disabilities	59.8±44.8	70.8±40.3	0.025
(3) Pain	68.2±24.6	78.4±23.2	< 0.001
(4) General Health	53.8±23.7	62.3±24.5	0.003
(5) Vitality	56.8±27.0	65.9±22.7	0.002
(6) Social Function	66.8±28.7	78.6±25.6	0.001
(7) Emotional Role Disability	63.1±43.6	66.6±41.2	0.539
(8) Mental Health	59.5±24.9	67.8±20.9	0.001

*Wilcoxon Signed Ranks test

Table 4. The comparison of clinical scales before and after one month of treatment in two groups (respiratory disturbance index, RDI<30/hr and RDI≥30/hr)

Clinical Scales		Before treatment (mean±sd)	After treatment (mean±sd)	p value*
RDI <30/hr (n=16)	Beck Depression Scale	11.6±2.1	10.1±10.3	0.572
	Beck Anxiety Scale	15.3±13.6	13.9±15.6	0.255
	Arizona Sexual Experience Scale	16.1±4.6	15.9±5.0	0.528
	Epworth Sleeping Scale	7.5±4.1	3.8±4.2	0.001
	Short Form (SF) 36			
	(1) Physical Function	61.8±27.5	75.6±20.8	0.006
	(2) Physical Role Disabilities	62.5±47.4	70.3±43.9	0.416
	(3) Pain	63.9±25.5	77.2±28.9	0.016
	(4) General Health	51.8±22.5	61.0±25.8	0.037
	(5) Vitality	58.7±31.5	62.5±26.8	0.797
	(6) Social Function	67.9±28.4	77.3±26.3	0.219
	(7) Emotional Role Disability	62.4±45.3	64.5±41.2	0.858
	(8) Mental Health	63.5±22.4	64.0±23.2	1.000
RDI≥30/hr (n=32)	Beck Depression Scale	13.6±10.2	7.6±7.3	<0.001
	Beck Anxiety Scale	13.4±10.4	9.0±10.2	0.002
	Arizona Sexual Experience Scale	13.2±4.7	12.5±4.6	0.220
	Epworth Sleepiness Scale	9.2±3.7	2.9±3.1	<0.001
	Short Form (SF) 36			
	(1) Physical Function	71.8±25.9	76.4±25.3	0.160
	(2) Physical Role Disabilities	58.5±44.2	71.0±39.2	0.031
	(3) Pain	70.4±24.3	79.0±20.3	0.001
	(4) General Health	54.9±24.6	63.0±24.3	0.021
	(5) Vitality	55.9±25.0	67.6±20.6	<0.001
	(6) Social Function	66.3±29.3	79.2±25.7	<0.001
	(7) Emotional Role Disability	63.5±43.4	67.6±41.8	0.401
	(8) Mental Health	57.5±26.1	69.7±19.8	<0.001

*Wilcoxon Signed Ranks test

After one month of CPAP/BPAP treatment, there was a significant improvement in ESS in all patients, suggesting that OSAS treatment was efficient. There was a significant decrease in depression and anxiety, which was compatible with the former studies, as well (23,28-32). These results confirm the beneficial effect of OSAS treatment on mood and anxiety symptoms. The Arizone Sexual Experience Scale scores, on the other hand, did not show any significant improvement. All SF36 sub-scales except Emotional Role Disability Scale were significantly increased after treatment, supporting the beneficial effects of CPAP/BPAP treatment on quality of life, as well. The positive influence of the treatment with CPAP/BPAP therapy on quality of life was previously shown in OSAS patients, (15,33) but to our knowledge, this is the first study performed in OSAS patients with psychiatric comorbidities. In addition, the comparison of clinical scales in two groups of OSAS (RDI <30/hr and RDI>30/hr) was analyzed in our study, and showed that severe OSAS group had more benefit than mild to moderate OSAS patients. Moreover, improvements in clinical measures of quality of life were observed regardless of whether patients had a psychiatric comorbidity or not.

As it seems that comorbidity of depression and anxiety disorder in OSAS is common, it is of great importance to keep in mind the possibility of OSAS comorbidity, especially in cases of drug resistant depression and anxiety disorder. The treatment of OSAS with CPAP or BPAP therapy seems to provide a marked benefit in depression, anxiety, and also in quality of life. On the other hand, more detailed evaluations are necessary to measure the change in sexual quality of life in these patients. Moreover, studies investigating long-term effects of OSAS treatment on psychiatric comorbidities will better emphasize the beneficial effects of treatment.

Table 5. The comparison of clinical scales before and after one month of treatment in patients with or without a comorbid psychiatric disorder

Clinical evaluation		Before treatment (mean±sd)	After treatment (mean±sd)	p value*
Patients with psychiatric comorbidity (n=27)	Beck Depression Scale	18.9±10.8	12.6±9.04	0.007
	Beck Anxiety Scale	20.4±11.2	16.7±13.5	0.040
	Arizona Sexual Experience Scale	15.7±4.8	15.8±5.1	0.714
	Epworth Sleepiness Scale	9.7±3.9	3.8±3.8	<0.001
	Short Form (SF) 36			
	(1) Physical Function	60.3±29.6	68.3±26.0	0.065
	(2) Physical Role Disabilities	36.1±44.5	50.9±44.1	0.063
	(3) Pain	56.9±23.4	69.1±23.7	0.002
	(4) General health	44.2±22.0	54.1±23.5	0.010
	(5) Vitality	42.4±23.9	54.2±22.3	0.002
	(6) Social Function	51.2±25.5	70.3±25.9	<0.001
	(7) Emotional Role Disability	41.9±42.9	50.6±43.7	0.255
	(8) Mental health	44.4±20.2	56.1±18.6	0.002
Patients without psychiatric comorbidity (n=21)	Beck Depression Scale	5.4±3.8	3.1±3.0	0.026
	Beck Anxiety Scale	5.9±4.3	2.8±2.8	0.014
	Arizona Sexual Experience scale	12.2±4.1	11.0±3.3	0.072
	Epworth Sleepiness Scale	7.4±3.6	2.4±3.0	<0.001
	Short Form (SF) 36			
	(1) Physical Function	79.0±17.7	86.1±15.8	0.032
	(2) Physical Role Disabilities	90.4±20.1	96.4±8.9	0.197
	(3) Pain	82.8±17.7	90.3±16.4	0.011
	(4) General health	66.3±20.1	73.0±22.0	0.130
	(5) Vitality	75.4±18.1	80.9±12.0	0.255
	(6) Social Function	86.9±18.7	89.2±21.3	0.399
	(7) Emotional Role Disability	90.4±26.1	87.2±26.8	0.577
	(8) Mental health	78.8±15.0	82.9±12.5	0.130

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