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Can Obstructive Sleep Apnea Syndrome be Associated with Urinary Symptoms and Erectile Dysfunction

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Abstract

We planned to investigate the association between Obstructive Sleep Apnea Syndrome (OSAS) and two common urological problems, namely Lower Urinary Tract Symptoms (LUTS) and Erectile Dysfunction (ED). An overnight polysomnograph test was performed for male patients over the age of 50 who presented to Düzce University Medical Faculty, Department of Chest Diseases with symptoms of OSAS. A total of 11 patients with moderate OSAS whose Apnea-Hypopnea index (AHI) was 15-30 and 18 patients with severe OSAS whose AHI was >30 were included in the study as the first group. The 21 OSAS negative patients with AHI <5 constituted the control group. Patients with diseases that could lead to LUTS and ED were excluded from the study for both groups. Urinary symptoms were evaluated with the International Prostate Symptom Score (IPSS), uroflowmetry, prostate volume. Erectile function was assessed according to the International Index of Erectile Function (IIEF). The groups were similar in terms of age, prostate specific antigen (PSA), prostate volume. No statistically significant difference was found between the groups in terms of IPSS values and uroflowmetry parameters ($p>0.05$). However, there was a statistically significant difference between the groups for nocturia episodes and IIEF scores ($p<0.05$). OSAS was not found to be an additional risk factor for LUTS other than nocturia. On the other hand, OSAS was related with ED and nocturia. We therefore believe patients with ED and/or nocturia should be evaluated for OSAS. It is also appropriate to investigate OSAS patients in terms of having ED.

Keywords: Obstructive sleep apnea syndrome, lower urinary tract symptoms, erectile dysfunction, nocturia

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Introduction

Lower urinary tract symptoms (LUTS) cause a significant public health problem. One in three or four men over the age of 50 has moderate to severe LUTS in evidence-based studies [1-3]. Given the prolonged life expectancy, it is obvious that these rates are increasing. LUTS is rarely life-threatening and the treatment objective is usually to relieve symptoms and to improve the quality of life. Besides BPH, LUTS can also be seen with so many disorders including urethral stenosis, prostatitis, neurological diseases and detrusor dysfunction. Aging and atherosclerosis have also been considered as factors in the etiology of LUTS in recent years [4]. Therefore, the pathogenesis of LUTS remains a complex unresolved issue. Consequently, the 4th Meeting of the International Consultation on BPH has therefore recommended using the term LUTS instead of 'prostatism symptoms' [5].

Erectile dysfunction (ED) is simply defined as the persistent inability to attain and maintain an erection sufficient to permit satisfactory sexual performance [6]. The overall prevalence of ED in the study conducted by Turkish Society of Andrology was 69.2% and it was also found that the severity and prevalence of ED increases with aging [7].

Sleep is an instinctive and recycling physiological process essential for a healthy life. Obstructive Sleep Apnea Syndrome (OSAS) is currently a significant chronic disease as common as diabetes mellitus and bronchial asthma with a prevalence of 2% to 14% in community-screened studies [8]. It is diagnosed with polysomnograph [8]. Apnea-Hypopnea Index (AHI) is the key factor in the diagnosis [9].

OSAS is shown to be related with many systemic pathologies [10]. Contemporarily, accelerated atherosclerosis and increased cardiovascular risk are frequently reported in patients with OSAS [11]. The management of OSAS is known to provide control of these systemic diseases as well [12]. Therefore, it is clear that OSAS may also be associated with these common urological disorders.

The aim of this prospective study was to investigate the relationship between OSAS and two prevalent urological disorders, LUTS and ED.

Materials and Methods

Male patients over the age of 50 who had an overnight polysomnography evaluation at Düzce University Medical Faculty, Department of Chest Diseases with a suspicion of OSAS were included in the study. The patients were divided into 2 groups according to the test results.

Apnea is defined as complete lack of air flow through the mouth and nose for 10 seconds or more. Hypopnea means at least 50% in the air flow for 10 seconds or more, along with 3% decrease in oxygen saturation or the development of arousal. AHI denotes the ratio obtained by dividing the total duration of apnea and hypopnea observed during sleep, by the total length of sleep. OSAS severity was evaluated based on AHI as normal: AHI < 5, mild: AHI between 5-15, moderate: AHI between 16-30, severe: AHI > 30 [9].

Eleven patients with moderate OSAS whose AHI was 15-30 and 18 patients with severe OSAS whose AHI was >30 were included in the study as the first group. The ones without clinically relevant OSAS (AHI was between 5-15) was excluded. Remaining 21 patients who were OSAS negative with AHI <5 constitute the second group. The Local Ethical Committee of Clinical Studies approved this study.

The inclusion criteria for the study were identified as patients who were sexually active, 50 years and older, and mentally suitable to provide consent. Cases with a history of receiving any medication for LUTS (alpha-blocker or 5-alpha reductase inhibitors), having medical treatment for ED in the last 3 months, chronic obstructive pulmonary disease, urogenital tract tumors, urogenital tract surgery, neurogenic bladder, hypogonadism, kidney and liver failure, urethral stenosis, bladder stone, overactive bladder and chronic prostatitis were not included in the study. In addition, malnourished patients and those using drugs that affect libido and erection negatively such as antidepressants were also excluded from the study.

All patients underwent uroflowmetric examination, prostate volume measurement, and International Prostate Symptom Score (IPSS) and International Erectile Function Index (IIEF-5) evaluation. Patients were grouped as mild (0-7), moderate (8-19), and severely symptomatic (20-35) according to the IPPS scores and as severe (5-7), moderate (8-11), mild-moderate (12-16), mild (17-21), and no ED (22-25) according to the IIEF scores.

All patients underwent a physical examination including a digital rectal examination and limited neurological examination. In addition, total PSA and creatinine levels were measured and urinalysis was performed. Two of the patients included in the study underwent transrectal ultrasonography-guided prostate biopsy due to abnormal rectal examination findings and/or an age-adjusted PSA level over 2.5 ng/mL. Radical prostatectomy was performed for one patient when the biopsy result revealed prostate adenocarcinoma.

Statistical Methods

The obtained data were loaded to the SPSS 15.0 package program. The statistical analyses comparing the patients' age, PSA level, prostate volume, AHI, IPSS, quality of life (QOL) score, Qmax (maximal urinary flow), Qmean (mean urinary flow), micturition volume, nocturia, prostate volume, and IIEF values according to the groups with and without OSAS were performed by using the same program. The distribution of the measurements in those with and without OSAS was examined with the Kolmogorov-Smirnov test. Student t-test was used for the comparison of these two groups in terms of variables that were normally distributed and the Mann-Whitney test was used for comparisons of variables that were not normally distributed. A calculated p value below 0.05 was considered statistically significant.

Results

The mean age of the patients was 59.17 (50-84) years for the first group (with OSAS) and 61.10 (50-76) years in the second group (without OSAS). No statistically significant difference was found in terms of age distribution between the groups (p=0.41). Likewise, no significant difference was found between those with and without OSAS in terms of PSA level, and prostate volume. The mean value for AHI, a diagnostic criterion of OSAS, was 42.50 in group 1 and 2.87 in group 2. Naturally, there was a statistically significant difference between the groups in terms of AHI (p=0.000. Table 1). No significant difference was observed between the groups for Qmax, Qmean, urination volume, IPSS and quality of life values (p>0.05 Table 1).

Table 1. The general distribution of the parameters for age, prostate volume, PSA, AHI, Qmax, Qmean, urination volume, IPSS and QOL.

	OSAS	Number of patients (n)	Mean	Standard deviation	P
Age (year)	(+) 1st Group (-) 2nd Group	29 21	59.17 61.10	8.22 7.84	0.41
Prostate Volume (cc)	(+) 1st Group (-) 2nd Group	29 21	41.04 39.12	13.4 12.8	0.76
PSA(ng/dl)	(+) 1st Group (-) 2nd Group	29 21	2.34 3.11	2.90 4.19	0.74
AHI	(+) 1st Group (-) 2nd Group	29 21	42.50 2.87	21.27 1.25	0.000
Qmax (ml/sec)	(+) 1st Group (-) 2nd Group	29 21	17.51 16.95	6.14 5.86	0.74
Qmean (ml/sec)	(+) 1st Group (-) 2nd Group	29 21	9.34 9.04	4.18 3.77	0.79
Volume (ml)	(+) 1st Group (-) 2nd Group	29 21	342.86 308.76	178.30 174.36	0.50
IPSS	(+) 1st Group (-) 2nd Group	29 21	10.58 9.19	7.29 6.37	0.48
QOL	(+) 1st Group (-) 2nd Group	29 21	2.37 2.04	1.47 1.24	0.40

OSAS: Obstructive Sleep Apnea Syndrome
AHI: Apnea-Hypopnea Index
PSA: Prostate specific antigen
Qmax: Maximum flow rate
Qmean: Mean flow rate
IPSS: International Prostate Symptom Score
QOL: Quality of Life

On the other hand, a significant difference was found between the groups for frequency of nocturia (Table 2). Nocturia was significantly more frequent in patients with OSAS with 44% of patients in this group waking at least three times to urinate at night, while this ratio was only 5% in patients without OSAS. The mean number of nocturia episodes was found to be 2.48 in group 1 and 1.10 in group 2. There was a statistically significant difference between the groups in terms of nocturia frequency (p=0.001).

Table 2. Severity of nocturia in patients with and without OSAS

	Number of Nocturia Episodes	Group 1 OSAS (+) n	%	Group 2 OSAS (-) n	%	P*
Nocturia Frequency	0	1	3.4	6	28.6	0.001
	1	8	27.6	8	38.1	
	2	7	24.1	6	28.6	
	3	7	24.1	1	4.8	
	4	1	3.4	0	0	
	5	5	17.2	0	0	

The mean IIEF score was 15.48 in group 1 and 19.90 in group 2 (Table-3). The erectile function survey scores were lower in those with OSAS. The difference between the groups was statistically significant (p=0.023).

Table 3. The comparison of the groups for erectile dysfunction

		Number of patients (n)	Mean IIEF	Standard deviation	P*
IIEF	OSAS (+) (1st Group)	29	15.48	7.64	0.023
	OSAS (-) (2nd Group)	21	19.90	5.27	

OSAS: Obstructive Sleep Apnea Syndrome
IIEF: International Erectile Function Index

Discussion

Studies LUTS is a common public health problem. Approximately 20% of males over the age of 50 have been found to have at least moderate LUTS [13]. The pathophysiology of LUTS is also not clear. For many years, BPH was thought to be almost the sole etiology for LUTS. However, the presence of similar symptoms in patients without infravesical obstruction has suggested that other factors may play a role in the development of LUTS. Indeed, studies suggest that aging can also itself can cause LUTS [14]. Detrusor instability and impaired detrusor contractility with age have been noted in some studies [15].

ED is a serious health problem that becomes more common. One of the most important studies on ED prevalence is the "Massachusetts Male Aging Study (MMAS)". MMAS is considered to be the first epidemiological cross-sectional study that covers impotence and the related factors. The joint prevalence of ED in men in the Boston area aged 40 to 70 years was reported as 52% [16]. Recent studies propose a higher prevalence [7].

The earliest and most common symptom of OSAS is snoring [17]. Almost 35% of patients who present with this symptom has OSAS. While simple snoring is a social disease and treatment is optional, OSAS is a disease that can cause serious morbidity and even mortality. The problems may include pulmonary hypertension, right heart failure, polycythemia, sleepiness during the day, unexplained sudden night deaths, personality and behavioral disorders, and restless sleep. Respiratory disorders during sleep should therefore be diagnosed and treated appropriately. The risk factors for LUTS and OSAS and those for ED often overlap. Obesity, hypertension, smoking, diabetes, and ischemic heart disease are the most important factors for all these three disorders. Therefore, a relation between OSAS and these disorders may be present.

No statistically significant difference has been found in patients with and without OSAS in terms of uroflowmetry, prostate volume, and IPSS parameters in our prospective study. On the other hand, increasing severity of OSAS appears to be associated with an increasing occurrence of overactive bladder and urgency incontinence in men [18]. Arıcıgil et al compared the uroflowmetry results before and after 2 months of CPAP treatment in their study involving 15 patients with severe OSAS [19]. They reported a statistically significant improvement. They therefore concluded that OSAS may cause LUTS. However; the results obtained from this current trial may be inadequate due to the low number of patients. Studies on very large series with more severe OSAS patients including treatment effects are therefore required.

On the other hand, we found nocturia to be more frequent in patients with OSAS compared to those without OSAS. Nocturia was also more common in OSAS patients in some other studies [20-22]. A study on 88 OSAS patients showed a remarkable decrease in the number of nocturia from 3.8 to 0.7 after CPAP treatment for four months [23]. CPAP therapy was thus shown to significantly reduce nocturia in patients with OSAS. CPAP therapy was thus shown

to significantly reduce nocturia in patients with OSAS. A recent study of about 1100 patients clearly demonstrated that nocturics with nocturnal polyuria had a significantly higher risk of having OSAS than nocturics with other pathophysiologies [24]. Interestingly they proposed that nocturia twice or more was not significantly associated with OSAS. Nevertheless, we recommend OSAS evaluation for patients presenting with nocturia.

We observed a significant difference on IIEF scores between those with and without OSAS. This finding was consistent with the literature. Perimenus et al. first reported ED as a complication of OSAS in 1977 [25]. Perimenus et al. compared a group that received CPAP treatment only and another group that received CPAP and sildenafil in another study and reported combination therapy to be more effective [26]. Another study confirmed that there was a correlation between severe OSAS and ED, and all subjects responded positively to the one-month CPAP treatment based on IIEF scores [27]. In contrast to these studies, Margel et al. reported CPAP treatment to increase the symptoms of ED [28]. It was gradually accepted that ED should be interpreted as a sign of a systemic vascular disease in the penis. Determination of a relationship between OSAS and ED is therefore extremely important.

Conclusion

This prospective study did not show any relationship between patients with and without OSAS in terms having LUTS. Clinical observations with a large number of patients involving prospective treatment arms are required to reach a definitive conclusion. On the other hand, it is observed that OSAS is a risk factor for both nocturia and ED. We therefore conclude that patients with nocturia and ED should be investigated for OSAS.

Conflict of interest

None of the contributing authors have any conflict of interest, including specific financial interests or relationships and affiliations relevant to the subject matter or materials discussed in the manuscript.

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