MEN'S SEXUAL HEALTH

May Dyspnea Sensation Influence the Sexual Function in Men With Obstructive Sleep Apnea Syndrome? A Prospective Control Study

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ABSTRACT

Introduction: Dyspnea sensation is frequently present in obstructive sleep apnea syndrome (OSA) patients; however, its possible influence on sexual function and body image has not been well analyzed.

Aims: To evaluate sexual function, the prevalence of sexual dysfunction (SD), and body image during sexual activity and its relationship with dyspnea in men with OSA.

Methods: 129 men were included in the prospective study, with 61 diagnosed with OSA (cases) and 68 age- and BMI-matched healthy control subjects. Patients were assessed for the severity of heart failure by the New York Heart Association scale and dyspnea by the Visual Analogue Scale. OSA was confirmed by in-laboratory polysomnography.

Main Outcome Measures: International Index of Erectile Function (IIEF) was used as a measure of sexual function, body image during sexual activity was assessed by the Body Exposure During Sexual Activity Questionnaire, whereas SD was diagnosed using criteria from the Diagnostic and Statistical Manual of Mental Disorders, 5th edition.

Results: The mean age of the studied population was 57.9 ± 10.8 years. Presence of dyspnea interfered with sexual life in 20% of men diagnosed with OSA and with work performance in 33%. Men with OSA had worse scores in IIEF-15 compared with control subjects and higher frequency of sexual distress compared with men with OSA. There were no differences in the rate of SD according to criteria from the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition. The presence of OSA worsened the perceived body image during sexual activity. The presence of dyspnea was the only negative factor affecting sexual function in general (IIEF-15 score) and 1 of the factors affecting erectile function and orgasmic function.

Conclusion: In men with OSA, body image is negatively influenced by the presence of OSA. Furthermore, the presence of dyspnea assessed by the New York Heart Association scale impairs sexual function in that group of men. **Skoczyński S, Nowosielski K, Minarowski Ł, et al. May Dyspnea Sensation Influence the Sexual Function in Men With Obstructive Sleep Apnea Syndrome? A Prospective Control Study. Sex Med 2019;7:303–310.**

Key Words: Obstructive Sleep Apnea Syndrome; Sexual Function; Sexual Dysfunction; Body Image; Dyspnea

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INTRODUCTION

Obstructive sleep apnea syndrome (OSA) is defined as multiple episodes of stopping breathing (apnea) or its decrease during sleep (Apnea-Hypopnea Index ≥ 5 per hour in symptomatic patients or ≥ 15 in symptom-free patients). OSA is typically known as a disease of middle-aged men. Recently, however, diagnosis of OSA among younger patients or even children is becoming more common.[1]

Typical symptoms of OSA include awakening with shortness of breath, apnea, snoring, morning headache, constant fatigue/somnolence, dyspnea during exercise, and exercise intolerance. In many cases, patients complain of emotional disturbance, lower libido, or erectile dysfunction (ED).[2−10] A more severe course of the disease is associated with comorbid obesity, which is also associated with a spectrum of health complications, including endocrine system disturbance.[11,12] Additionally, obesity may be a factor of subfertility or even infertility (decreasing sperm quality, sperm concentration, and sperm count, as well as spermatozoa morphology).[13,14]

It is well recognized that men with OSA might present a wide spectrum of sexual problems,[2−10] where ED is the most frequent. Furthermore, OSA is believed to be 1 of the independent risk factors for development of ED and other sexual dysfunction (SD) in men. The cause of ED in men with OSA is multifactorial. ED can be caused by neurologic, hormonal, psychological, or vascular disease. It may also be a result of disturbed sleep, leading to nocturnal hypoxia and hypercapnia, as well as chronic fatigue, all causing vascular dysfunction and the abnormal activation of the sympathetic system. These disturbances result in a lack of sufficient blood supply to penile tissue, insulin resistance, and oxidative stress induction, which might be manifested as ED. The last 2 variables are also well-known cardiovascular risk factors. Because several studies confirmed the negative correlation between testosterone level and severity of OSA, decreased testosterone level might be associated with the presence of SD.[11,12,15−18] Obesity might also contribute, because excessive aromatase expression in fat tissue and increased level of sex hormone-binding globulin leads to decrease in testosterone level.[13,14] Additionally, because dyspnea caused by heart failure has been associated with OSA in multiple trials, the fear of the lack of breath during sex could also prevent sexual activity.[13,14] Furthermore, decreased cardiac output and vascular endothelium function dysregulation may lead to exertional dyspnea, decreased exercise capacity, and sexual performance, which may cause sexual dysfunction and sexual avoidance in men with OSA.[19−21] Currently, various mechanisms are reported to impair sexual function in men with OSA; however, there is no research assessing whether this may be explained by a patient's dyspnea sensation.

According to a recent metanalysis, there are no consistent data on the influence of OSA on sexual function in men.[9] A few studies have, indeed, found a high incidence of ED in men with OSA. However, none of those studies use criteria from the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5), for diagnosing ED, premature ejaculation, or loss of sexual desire, as in this article.

In this study it was hypothesized that patients with OSA may have impaired sexual function and have a higher likelihood of sexual dysfunction, which may be related to their dyspnea sensation. To test this hypothesis, the magnitude of dyspnea sensation in OSA patients in context of their sexual function, prevalence of sexual dysfunction, and body image during sexual activity were evaluated. The sexual disturbances were correlated with reported dyspnea sensation. This study also aimed to establish whether OSA influences sexual performance, body image, and the risk of sexual dysfunction in men.

MATERIAL AND METHODS

A group of 100 heterosexual men between 31−76 years of age hospitalized in the Department of Pneumonology, School of Medicine in Katowice, Medical University of Silesia, Katowice, between January 2017−December 2017 was eligible for the prospective control-matched study. The study protocol was approved by the Ethics Committee Medical University of Silesia (KNW/0022/KB1/53/I/15). The inclusion criteria were diagnosis of OSA based on in-lab polysomnography and providing informed consent to participate in the study. Men with uncontrolled hypertension, uncontrolled diabetes mellitus, unstable coronary artery disease, thyroid diseases, current or past psychiatric disorders, including depression, those who were <6 months after having myocardial infarction, or those taking medications that might interfere with sexual function (selective serotonin reuptake inhibitors, psychoactive drugs) were excluded from the study. The control group consisted of 100 age- and BMI-matched, healthy heterosexual men recruited from partners of women attending yearly medical check-up in an outpatient gynecological clinic in Katowice, Poland. Those men were free from OSA symptoms and scored 0−2 points on the STOP-Bang questionnaire and 0−4 points in Epworth sleepiness scale performed during medical consultations.[22] The additional exclusion criteria for the control group were diagnosed chronic heart failure and the presence of OSA. The Polish version of the Hospital Anxiety and Depression Scale was used to screen for depressive symptoms; men scoring 11 points or higher were excluded from the study.[23]

All consecutive male patients admitted to the department of Pneumonology between January 2017−December 2017 in Katowice with a suspicion of OSA were informed about the possibility and invited to take part in this prospective study. Patients were informed about the study protocol. All willing subjects received a written informed consent form and were invited to ask questions concerning the project and OSA itself. All patients were assured that participation in the study was

voluntary, and acceptance or refusal to participate in the study would not influence their diagnostic or therapeutic procedures.

The researched questionnaire contained questions on general health, socioeconomic issues, sexual history, and OSA symptoms. Sexual functions were evaluated by International Index of Erectile Function (IIEF-15) in 5 domains: erectile function (EF), orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction.[24,25] Men scoring <26 points in EF domain were recognized as being at risk of ED.[24,25] Sexual dysfunction was diagnosed based on DSM-5 criteria[26] during a semistructured sexual interview performed by the first 2 authors of the study. Body image was evaluated by the Polish version of the Body Exposure During Sexual Activity Questionnaire (BESAQ).[27] The questionnaire contained 28 sentences related to the feeling of self-consciousness during sexual activity, with answers ranging from 0 (never)—4 (always or almost always). The score ranges from 0—4, with higher scores reflecting lower levels of self-comfort exposing one's body while having sexual encounters and greater level of sexual avoidance.[27] All patents were also asked to declare intravaginal ejaculation latency time (IELT), defined as a mean time between the start of the vaginal intromission and the start of intravaginal ejaculation.[28] Additionally, all patients were assessed for the severity of dyspnea sensation (they had heart failure; if not, only the sensation of dyspnea was assessed) by the New York Heart Association (NYHA) scale and dyspnea by the Visual Analogue Scale.

The statistical analysis was performed with Statistica 14.0 pl (StatSoft, Krakow, Poland). Because none of the variables were normally distributed or met the assumption of variance homogeneity, nonparametric tests were used. The Mann-Whitney U test and Pearson χ^2 test (with Yates's correction or Fisher's exact test) were used for quantitative and qualitative variables, respectively. To evaluate factors affecting sexual function assessed by IIEF and affecting body image, multiple forward regression models were used. The scores for BESAQ, IIEF, and its domains served as dependent factors. The remaining socioeconomic, reproductive, and sexual behavior variable were once dependent factors. $P < .05$ was statistically significant.

RESULTS

Of all eligible individuals, 15 (10 cases and 5 control subjects) refused to participate, whereas an additional 29 cases and 27 control subjects met the exclusion criteria, leaving 61 individuals with OSA and 68 healthy age- and BMI-matched control subjects, which were included in the final analysis. The mean age of the studied population was 57.9 ± 10.8 years.

The results showed that 88.6% of men with OSA reported the presence of paroxysmal dyspnea, mostly a few times a week (59.2%), with 37.1% having night-time dyspnea. Presence of dyspnea interfered with sexual life in 20% of men diagnosed with OSA and work performance in 33%. According to the EF domain of IIEF-15, 72.1% of men with OSA men had ED. Furthermore, the median IELT was 10 minutes, and the median BESAQ score was 1.29 points. Only 8 (13.1%) men in the OSA group were diagnosed with sexual dysfunction according to DSM-5 criteria (Tables 1 and 2).

The comparison of men with OSA and healthy control subjects revealed that men with OSA were statistically more religious, had higher smoking burden (pack-years), higher NYHA scores, and longer duration of relationship compared with control subjects (Table 1). Additionally, the lower rate of white-collar workers and a higher rate of Catholics and ex-smokers were noted in the OSA group (Table 2).

The evaluation of sexual function revealed that men with OSA had worse erectile function, orgasmic function, intercourse satisfaction, and overall sexual function (total IIEF score) but higher sexual desire evaluated by IIEF-15 compared with control subjects (Table 1). Sexual distress was higher in control subjects compared with men with OSA. The prevalence of self-reported sexual dysfunction was higher in that group. However, there were no differences in the rate of SD when DSM-5 criteria were applied (Table 2).

The analysis of potential factors influencing sexual function revealed that the presence of OSA worsened perceived body image during sexual activity. Furthermore, the presence of dyspnea was the only negative factor affecting sexual function in general (IIEF-15 score), as well as 1 of the factors affecting erectile function and orgasmic function.

We did not perform logistic regression to recognize potential risk factors of SD in this group of individuals, because only 13 men in the total population (10.0%) were diagnosed with SD according to DSM-5 criteria. Post-hoc power analysis was also performed. For the detected differences in BESAQ, IIEF total score, EF domain of IIEF scores and IELT scores the power of 60.4%, 97.7%, 93.0%, and 10.1% was achieved, respectively.

DISCUSSION

This study describes sexual function and body image in men diagnosed with OSA in comparison with healthy control subjects. It is 1 of few in this field, we believe, that might have major clinical implications. First, all men diagnosed with OSA should be referred for sexologic/psychological counseling. Second, sexual life should be discussed with all patients with OSA. Finally, because body image might be impaired in men with OSA, intervention should be undertaken to decrease symptoms of OSA and improve general exercise capacity to improve body image during sexual activity and sexual function in general.

On the basis of the results of our study, the prevalence of ED assessed by EF domain of the IIEF-15 in men with OSA was 71.1%. That number was much higher compared with in the study by Gürbüz et al[29] (26 points, no differences between OSA and control subjects) but similar to the recent study by Budweiser et al,[6] Zhang et al,[11] and Popp et al.[4] As in most studies, the prevalence of EF based on IIEF-15 scores varies between 41%—80%;[30] the possible reason for different results in the

Table 1. General characteristics of the studied population—Quantitative variables

	General population				OSA				Controls				
Variables	Median	Lower quartile	Upper quartile	SD	Median	Lower quartile	Upper quartile	SD	Median	Lower quartile	Upper quartile	SD	*P* value
Age (years)	57.95	50.00	65.00	10.80	58.00	52.00	67.00	11.52	57.47	50.00	61.02	10.06	0.26
BMI	30.45	27.72	34.42	4.76	31.02	28.41	35.35	4.80	29.77	26.79	33.32	4.62	0.06
AHI	39.50	28.70	55.45	20.58	39.50	28.70	55.45	20.58					
VAS score	1.00	1.00	2.00	0.99	1.00	1.00	2.00	1.27	1.00	1.00	2.00	0.61	0.37
NYHA class	**1.00**	**1.00**	**1.00**	**0.55**	**1.00**	**1.00**	**2.00**	**0.73**	**1.00**	**1.00**	**1.00**	**0.00**	**0.001**
Smoking (pack-years)	**15.00**	**5.00**	**30.00**	**18.58**	**15.00**	**5.00**	**32.50**	**20.44**	**17.50**	**11.00**	**20.00**	**5.91**	**0.001**
How do you rate your weight?*	4.00	4.00	4.00	0.75	4.00	4.00	4.00	0.78	4.00	3.00	4.00	0.71	0.08
How satisfied are you with your body image?*	3.00	3.00	4.00	1.01	3.00	3.00	4.00	1.00	3.00	3.00	4.00	1.02	0.48
Religiosity*	**3.00**	**2.00**	**4.00**	**1.18**	**3.00**	**3.00**	**4.00**	**1.01**	**3.00**	**1.00**	**3.00**	**1.23**	**0.001**
Age of the first vaginal sex	18.00	17.00	20.00	3.40	18.00	17.00	20.00	2.68	18.00	17.00	20.00	3.84	0.38
Importance of sex*	4.00	3.00	4.00	0.68	4.00	3.00	4.00	0.72	4.00	3.00	4.00	0.64	0.34
Duration of the relationship (years)	**31.00**	**16.00**	**38.00**	**13.41**	**34.00**	**20.50**	**40.00**	**12.33**	**20.00**	**5.00**	**31.00**	**13.78**	**0.001**
Quality of relationship*	4.00	3.00	5.00	1.19	5.00	3.00	5.00	1.16	4.00	3.00	5.00	1.21	0.37
IELT (min)	10.00	5.00	15.00	8.07	10.00	4.00	15.00	9.13	10.00	5.00	15.00	7.37	0.96
Number of lifetime sexual partners	3.50	1.00	9.00	12.61	3.00	1.00	5.00	9.53	4.00	1.00	10.00	14.02	0.38
Quality of sexual life*	4.00	3.00	4.00	0.92	4.00	3.00	4.00	0.91	4.00	3.00	4.50	0.91	0.22
Satisfaction from a partner as a lover*	4.00	3.00	5.00	0.98	4.00	3.00	4.00	0.88	4.00	3.00	5.00	1.05	0.52
HADS—depression	6.00	4.00	8.00	2.67	6.00	2.00	9.00	3.42	6.00	5.00	8.00	1.91	0.23
HADS—anxiety	6.00	4.00	8.00	2.45	7.00	3.00	8.00	3.27	6.00	4.50	8.00	1.98	0.80
BESAQ score	1.18	0.93	1.50	0.55	1.29	0.95	1.61	0.74	1.16	0.93	1.50	0.43	0.32
IIEF—EF	**25.50**	**18.00**	**28.50**	**8.35**	**22.00**	**11.00**	**28.00**	**9.24**	**28.00**	**23.00**	**29.00**	**6.80**	**0.00**
IIEF—IS	**10.00**	**6.50**	**12.00**	**4.35**	**8.00**	**5.00**	**10.00**	**3.61**	**11.00**	**10.00**	**13.00**	**4.32**	**0.00**
IIEF—OF	**8.50**	**7.00**	**10.00**	**2.18**	**7.00**	**6.00**	**8.00**	**1.90**	**10.00**	**8.00**	**10.00**	**1.93**	**0.00**
IIEF—SD	**8.00**	**6.00**	**10.00**	**3.47**	**11.00**	**7.00**	**12.00**	**5.01**	**7.00**	**6.00**	**8.00**	**1.68**	**0.00**
IIEF—OS	8.00	7.00	10.00	2.35	8.00	5.00	9.00	2.39	8.00	8.00	10.00	2.28	0.06
IIEF—total score	**61.00**	**47.50**	**68.00**	**17.75**	**55.00**	**37.00**	**64.00**	**20.21**	**64.00**	**54.00**	**69.00**	**14.37**	**0.00**

Statistically significant differences are bolded.

AHI = Apnea-Hypopnea Index; BESAQ = Body Exposure in Sexual Activities Questionnaire; EF = Erectile Function; HADS = Hospital Anxiety and Depression Scale; IELT = Intravaginal Ejaculation Latency Time; IIEF-15 = International Index of Erectile Function; IS = Intercourse Satisfaction; NS = not significant; NYHA = New York Heart Association; OF = Orgasmic Function; OS = Overall Satisfaction; OSA = obstructive sleep apneaobstructive sleep apnea; SD = Sexual Desire; VAS = Visual Analogue Scale.

*5 point Likert scale.

study by Gürbüz et al[29] might be lower age (age is an independent factor decreasing sexual performance over time). Similarly, the prevalence of ED according to DSM-5 criteria was low—13.1%. No studies presenting incidence of ED according to DSM-5 criteria in patients with OSA were published, making the comparison to other studies impossible.

In most studies, and in the current one, men with OSA scored lower in all IIEF-15 domains. However, Stannek et al,[31] similarly to our results, showed no differences in sexual desire between healthy control subjects and men with OSA. In contrast, Ak et al[32] noticed no differences in sexual satisfaction dimensions. Furthermore, some other factors affecting sexual function were detected in our study, including the importance of sex to the respondents, quality of the relationship, and employment status (see Table 3 for details). Interestingly, sexual desire was higher in men with OSA and correlated negatively with duration of relationship and positively with importance of sex (Table 3). Based on Sternberg's Triangular Theory of Love, sexual desire might diminish with age—at first, passion is dominant, but, as time passes, its level decreases as intimacy level increases, and finally, in a mature relationship, commitment becomes dominant over the 2 other components.[33] That would explain the present correlation.

Although, in our study, the mean dyspnea severity assessed by both the NYHA scale and Visual Analogue Scale was low, the results indicated the negative correlation between dyspnea severity (NYHA scale) and erectile function. It may be assumed that in patients in NYHA III and NYHA IV, the magnitude of dyspnea might be high, leading to sexual difficulties and avoidance.[34] Dyspnea could also cause fear of heart failure symptoms and general anxiety about sexual activity.[35] Although, in the study by Santos et al,[36] ED was high in patients with OSA, its magnitude was related to age and concomitant diabetes rather than to OSA itself.[30] In contrast, in our study, in the multiple regression analysis, increasing dyspnea assessed with the NYHA scale, was found to be significantly negatively correlated with total IIEF-15 score and erectile and orgasmic function. This may be explained by the fact that the population assessed by Santos et al[36] was, on average, 6 years younger than ours. Based on both studies, it may be assumed that OSA, together with increasing age, contributes to cardiovascular complications, which may result in increased dyspnea sensation and, therefore, may lead to ED development. It is worth noting that peripheral occlusive disease was also an independent risk factor for ED in the study by Budweiser at al.[10]

Body image is "an individual and composite" that depends on many factors, including sex, age, and physical and mental health.[37] It is well established that body image worsens with age.[37] In this study, body image during sexual activity was lower compared with normative data—1.0 for the US population[27]—the mean BESAQ was 1.21, 1.45, and 1.21 the for general population, cases, and control subjects, respectively. Body image was negatively correlated with education (individuals with higher education had lower body image) and the presence of OSA (lower body image in men with OSA). There were no correlations between sexual satisfaction measured with IIEF-15 and body satisfaction, as described in previous studies.[32,38] Other factors may play a role, such as body image in the adolescent age and personality structure[39,40]—those factors were not analyzed in the study. None of available studies evaluated body image in men with OSA.

Table 2. General characteristics of the studied population—Qualitative variables

Variables % (n)	OSA	Controls	*P* value
Residency			
City	80.8 (42)	89.7 (61)	NS
Rural	19.2 (10)	10.3 (7)	NS
Education			
Primary	19.3 (11)	17.6 (12)	NS
Secondary	47.4 (27)	41.2 (28)	NS
Tertiary	33.3 (19)	41.2 (28)	NS
Employment			
Blue collar worker	21.1 (11)	17.9 (12)	NS
White collar worker	**23.1 (12)**	**46.3 (31)**	**.04**
Unemployed/retired	**53.8 (29)**	**37.8 (24)**	**.03**
Religious affiliation			
Catholic	**94.3 (50)**	**70.1 (47)**	**.001**
Atheist	**1.9 (1)**	**25.4 (17)**	**.001**
Other	3.8 (2)	4.5 (3)	NS
Smoking			
Yes	18.3 (11)	17.6 (12)	NS
No	**20.0 (12)**	**82.3 (56)**	**.001**
Ex-smoker	**61.7 (37)**	**0.0. (0)**	**.001**
Currently relationship - YES	89.7 (52)	89.7 (61)	NS
Anxiety (HADS) - YES	3.3 (2)	1.5 (1)	NS
Sexual activity in last 12 weeks - YES	80.8 (42)	91.2 (62)	NS
SD in partner - YES	14.7 (9)	26.5 (18)	NS
Self-reported ED	**21.3 (13)**	**5.9 (4)**	**.02**
ED (IIEF-15)	**72.2 (44)**	**34.4 (23)**	**.001**
ED (DSM-5)	6.6 (4)	1.5 (1)	NS
Self-reported PE	**18.0 (11)**	**4.4 (3)**	**.03**
PE (DSM-5)	1.6 (1)	0.0 (0)	NS
Self-reported DE	**6.6 (4)**	**0.0 (0)**	**.03**
DE (DSM-5)	1.6 (1)	0.0 (0)	NS
Self-reported low satisfaction	21.3 (13)	14.7 (10)	NS
Low satisfaction (DSM-5)	3.3 (2)	5.9 (4)	NS
Pain disorders (both self-reported and DSM-5 criteria)	0.0 (0)	0.0 (0)	NS
Sexual distress	**6.6 (4)**	**27.3 (18)**	**.01**

Significant differences are bolded.
DE = delayed ejaculation; DSM-5 = Diagnostic and Statistical Manual of Mental Disorders, 5th edition; ED = erectile dysfunction; FSD = female sexual dysfunction; HADS = Hospital Anxiety and Depression Scale; IELT = Intravaginal Ejaculation Latency Time; NS = not significant; OSA = obstructive sleep apneaobstructive sleep apnea; PE = premature ejaculation; SD = sexual dysfunction.

Table 3. Multiple regression analysis

	BESAQ		EF		OF		SD		IS		OS		IIEF — total score	
	t	*P* value	t	*P* value	t	*P* value	t	*P* value	t	*P* value	t	*P* value	t	*P* value
Age			**−2.96**	**.01**										
NYHA class			**−2.64**	**.0001**	**−2.11**	**.03**							**−4.11**	**.001**
VAS score														
Presence of OSA	**2.65**	**.01**												
BMI														
How do you rate your weigh—normal					**2.22**	**.03**								
BESAQ														
Education—secondary	**2.60**	**.01**												
Employment—unemployed					**−4.11**	**.001**								
Employment—blue collar worker					**4.39**	**.001**								
Duration of relationship (years)							**−2.71**	**.01**						
Quality of relationship*—poor			**−2.13**	**.03**					**−2.21**	**.03**	**−2.63**	**.01**	**−2.2**	**.03**
Quality of relationship*—good			**2.65**	**.01**					**2.98**	**.001**			**2.57**	**.01**
Importance of sex*—low					**−3.34**	**.01**			**−2.73**	**.01**				
Importance of sex*—medium							**−2.01**	**.04**						
Importance of sex*—high					**2.11**	**.04**								

Only significant variables are presented and bolded.
Statistics for the models: for EF, adjusted R^2 for the model = .31, F(5,89) = 5.89, *P* = .0001; for IS, adjusted R^2 = .34, F(8,84) = 5.53, *P* = .00001; for OF, adjusted R^2 = .45, F(10,78) = 6.51, *P* = .0001; for SD, adjusted R^2 = .31, F(4,44) = 4.78, *P* = .003; for OS, adjusted R^2 = .24; F(4,82) = 6.58, *P* = .0001; for total IIEF score, adjusted R^2 = .30, F(1,34) = 6.25, *P* = .001; for BESAQ, adjusted R^2 = .14; F(3,81) = 4.46, *P* = .01.
BESAQ = Body Exposure in Sexual Activities Questionnaire; CSFQ = Changes in Sexual Functioning Questionnaire; EF = erectile function; HADS = Hospital Anxiety and Depression Scale; IIEF-15 = International Index of Erectile Function; IS = intercourse satisfaction; NYHA = New York Heart Association; OF = orgasmic function; OS = overall satisfaction; OSA = obstructive sleep apnea; SD = sexual desire; VAS = Visual Analogue Scale.
*5-point Likert scale.

Our study has some limitations. First, the relatively small study group did not allow us to divide the patients into subgroups according to disease severity based on the Apnea-Hypopnea Index. The severity of OSA might be associated with higher degree of sexual dysfunction as shown in the study by Margel et al.[41] However, more recent studies did not show such association.[31] Second, polysomnography should be performed in all recruited individuals, both cases and control subjects. However, it must be emphasized that, according to guidelines from the American Academy of Sleep Medicine, polysomnography in symptom-free patients is not required to exclude OSA.[42] Third, sex hormone levels were not assessed. However, that direct correlation between testosterone level and sexual function, unlike in the general population,[39–41] in men with OSA is poor.[15,43] Fourth, the prevalence of sexual dysfunction was surprisingly low in the studied population. That might be due to strict DSM-5 criteria, especially in the context of the criterion of the presence of difficulties in approximately 75% of sexual encounters. Finally, impaired vigilance performance, which, in the article by Popp at al,[4] was postulated to be an independent correlate of ED in patients with OSA, was not assessed. Regardless of these limitations, the study of age- and BMI-matched groups enabled us to assess factors affecting sexual function in men with OSA.[26,31,36,44,45–47] The results of this research form a strong base for further studies on sexual function in men with OSA, including sex hormone assessment, objective measurement of exercise capacity, and DSM-5 criteria for SD.

CONCLUSION

In men with OSA, body image is negatively influenced by the presence of OSA. Furthermore, the presence of dyspnea assessed by NYHA scale impairs sexual function in that group of men.

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