

Psychological morbidity, illness representations, and quality of life in female and male patients with obstructive sleep apnea syndrome

Rute Sampaio^{a*}, M. Graça Pereira^a and João C. Winck^b

^a*School of Psychology, University of Minho, Braga, Portugal;* ^b*Department of Medicine, Oporto University, Porto*

(Received 29 October 2010; final version received 6 April 2011)

Obstructive sleep apnea syndrome (OSAS) is a sleep-related breathing disorder that affects both women and men. The aim of this study was to characterize and investigate the differences in terms of anxiety, depression, illness perception, and quality of life between female and male OSAS patients from a total of 111 patients (33 women and 78 men) who were recently diagnosed with OSAS in an outpatient clinic of a University Hospital in Portugal. They underwent a standardized protocol that included evaluation to assess of psychological morbidity (anxiety and depression – Hospital Anxiety and Depression Scale), illness representations (Brief Illness Perception Questionnaire), and quality of life (Sleep Apnea Quality of Life Index). The most significant differences between female and male OSAS patients result of apnea/hypopnea index (AHI), after controlling for body mass index ($p < 0.05$); anxiety ($p = 0.000$) and depression ($p < 0.005$); consequences ($p < 0.005$), identity ($p = 0.000$), coherence ($p < 0.01$), and emotional representation ($p < 0.005$) of OSAS; and for daily functioning ($p = 0.000$), emotional ($p = 0.001$), and symptoms ($p < 0.05$) domains of quality of life. Data suggest that women revealed more psychological morbidity associated with OSAS. Therefore, it seems extremely important to look at women as potential patients for sleep apnea and avoid looking up for a pattern of symptoms that rely on men as a norm to which women are compared.

Keywords: obstructive sleep apnea syndrome; anxiety; depression; illness representations; quality of life

Introduction

Obstructive sleep apnea syndrome (OSAS) is a highly widespread sleep-related breathing disorder in adults. The estimated prevalence in western countries has a range of about 2–4% for men and 1–2% for women (Young, Evans, Lin, & Patla, 1997; Young, Peppard, & Gottlieb, 2002). The male-to-female ratio is estimated between 3:1 and 5:1 in the general population and at 8:1 to 10:1 in some clinical populations (Young et al., 1993). In order to evaluate the development of OSAS, it is important to notice that what follows the occurrence of an apnea is an arousal that affects patient's normal breath (American Academy Sleep Medicine Task Force [AASM], 1999). Inevitably, the quality of sleep is impaired. More precisely, OSAS is a respiratory problem characterized by recurrent episodes of partial and/or complete

*Corresponding author. Email: rutesampaio@iol.pt

upper airway obstruction resulting in hypopnea or apnea, defined as a 10 s minimum interval, that are significant when the number of events are superior than five per hour. The apnea/hypopnea index (AHI) describes the severity of OSAS according to standard criteria as follows: mild as an AHI between 5 and 15 events/h; moderate as an AHI between 15 and 30 events/h; and severe as an AHI superior a 30 events/h (AASM Task Force, 1999). The distribution of AHI is continuous and it increases with age (Young et al., 2002). Since it is a prevalent sleep disorder, Tarasiuk, Greenberg-Dotan, Brin, Tal, and Reuveni (2005) stated that OSAS patients are frequent users of health care services in terms of hospitalization, outpatients clinic visits, and medication use. Patients usually develop two disabling symptoms: excessive daytime sleepiness and loud snoring witnessed by the bed partner. Other symptoms are also important to support the diagnosis of OSAS, such as nocturnal choking or gasping, nocturia, impotence, fatigue, morning headaches, and memory impairment (McNicholas, 2008). OSAS has been also associated with a decrease of work productivity (Mulgrew et al., 2007), social problems (Glebocka, Kossowska, & Bednarek, 2006), reduced participation and enjoyment in everyday activities (Engleman & Douglas, 2004), and marital problems (Parish & Lynq 2003). Moreover, other important consequences of sleepiness are car and work accidents (Findley & Suratt, 2001; Krieger et al., 1997; McArdle et al., 1999; Terán-Santos et al., 1999). All these symptoms and their consequences have impact on the biological, social, and psychological domains of the patient.

A clear relationship between OSAS and hypertension has been consistently demonstrated, and OSAS increases the likelihood of this disorder (Grotz et al., 2006; Yaggi et al., 2005). Undiagnosed OSAS is one of the main reasons for the development of hypertension and accepted as one of its main causes by the 7th Joint National Committes Report (Dursunoğlu et al., 2006). OSAS, hypertension, and obesity coexist and share most of the pathogenesis and cardiovascular consequences (Wolf, Lewicka, & Nartiewicz 2007). It is well known that obesity is a major risk factor for OSAS (Young et al., 1993), and in the Wisconsin Sleep Cohort Study, OSAS females had a greater body mass index (BMI) than OSAS males (Young, Hutton, Finn, Badr, & Patla, 1996).

Most studies measuring quality of life with SF-36 show aspects of quality of life markedly impaired in OSAS (Ambrosio, Bowman, & Mohsenin, 1999; Gonçalves, Paiva, Ramos, & Guillemineault, 2004; Jenkinson, Stradling, & Petersen, 1997; Smith & Shneerson, 1995). This holds true when using the Calgary Sleep Apnea Quality of Life Index (SAQLI) that assesses specifically quality of life in sleep apnea patients (Flemons & Reimer, 2002). In a systematic review of quality of life, in obstructive sleep apnea, conducted by Moyer, Sonnad, Garetz, Helman, and Chervin (2001), the impairment in quality of life is well documented and the authors suggest the SAQLI to be a potentially useful instrument.

The impairment of cognitive performance and mood are two of the main consequences of nocturnal hypoxemia or severe sleepiness (Engleman & Douglas, 2004). An European study of 18,980 subjects, including Portugal, concluded that 17.6% of subjects with a breathing-related sleep disorder also presented a major depressive disorder, after controlling for obesity and hypertension (Ohayon, 2003). In a review addressing the practical clinical aspects of the complex relationship between psychiatric disorders and sleep, Sateia (2009) states that women demonstrate more depressive symptoms than men, although apnea severity did not differ between groups. Also, depression explained about 25% of the variance for fatigue, whereas OSAS

severity explained only 13% (Bardwell, Ancoli-Israel, & Dimsdale, 2007 cited by Sateia, 2009). Another review conducted by Schröder and O'Hara (2005) describes the existence of a complex relationship between depression and OSAS in terms of clinical presentation and varies widely depending on age, gender, AHI, and general demographic and health characteristics of the patients under investigation. The authors advised for the need of taking into account the different subtypes of mood disorder as well as the causal relationship and mechanisms between depression and OSAS. OSAS patients also have high values of anxiety (16.7% in a American survey of 4060 subjects) (Glebocka et al., 2006), defined as tension and irritability, as a direct consequence of sleep impairment (Bardwell, Berry, Ancoli-Israel, & Dimsdale, 1999). Illness perception is a very important construct introduced by Leventhal, Meyer, and Nerenz (1984) referring to how individuals tend to construct their own illness representation and its influence on health behavior, namely therapeutic adherence (Ogden, 2004). When symptoms of OSAS are visible or cause pain, patients give them more attention. This selective attention to symptoms has serious consequences when the symptoms, although serious, are still scarcely perceptible, as pointed by Knauper (2001). The perception and interpretation of symptoms arise from the relationship between external and internal stimuli and from individuals' beliefs. Awareness of symptoms is strongly affected by psychological factors and when diagnosed with a disease, the individual develops beliefs regarding the condition that influence the decision concerning the best strategies to manage the disease (Petrie & Pennebaker, 2004). Psychological states such as anxiety and depression make people more aware of physical problems (Petrie & Pennebaker, 2004) and patients with depressed mood are more pessimistic about the action they can take in relation to symptoms, than patients without depressive symptoms (Knauper, 2001). In the present moment, we are not aware of any studies that have assessed illness perception in OSAS.

The aim of the present study was to assess clinical, sociodemographic, and psychological such as anxiety, depression, illness perception, and quality of life in female and male patients from a cohort of patients who were recently diagnosed with OSAS in an outpatient clinic of a University Hospital. According to literature, we expected a relationship among depression, anxiety, less quality of life, more threatening illness representations, and sleepiness on both female and male patients. It was also hypothesized that when compared with male patients, female patients would report significantly more anxiety, depression, less quality of life, and more threatening illness representations.

Material and methods

Participants

During a six month period, consecutive patients, presenting to the Sleep Disordered Breathing Clinic of a University Hospital with OSAS diagnosis with CPAP treatment indication, underwent a standardized protocol that included general clinic evaluation by the sleep specialist, home sleep study, and a psychological evaluation that included psychological morbidity, illness perceptions, and quality of life. None of the participants had a psychiatric disorder or other sleep disorders.

The study was approved by S. John's Hospital research ethics committee, and written informed consent was obtained from all participants before participation in the study.

Disease assessment – home sleep study

An overnight sleep study was performed using a five-channel recording device (Sleep Screen, ViasysTM Healthcare) that produces a computerized recording of variations in oronasal airflow (measured by nasal cannula), body position, wrist actimetry, pulse rate, and arterial oxygen saturation (measured by finger pulse oximetry). The device estimates the total sleep time, and it automatically calculates the number of apneas plus hypopneas per hour of estimated sleep time. Sleep technicians carried out a manual analysis of the recordings, by counting apnea (episodes of $\leq 20\%$ of previous airflow with at least 10 s of duration) and hypopnea episodes (episodes showing 20–50% of the previous airflow, with at least 10 s of duration together with a 4% dip in oxygen saturation and/or an arousal), dividing the total number of these episodes by the sleep time in hours, obtaining a manual respiratory disturbance index according to established criteria (AASM Task Force, 1999).

Psychological assessment

All the patients diagnosed with OSAS completed four self-report measures after a signed informal consent. For this study, four questionnaires were used: Hospital Anxiety and Depression Scale (HADS) (Zigmond, A. & Snaith, 1983); Brief Illness Perception Questionnaire (IPQ-B) (Broadbent, Petrie, Maina, & Weinman, 2006); SAQLI (Flemons & Reimer, 2002); and Epworth sleepiness scale (ESS; Johns, 1991). All instruments were used in their Portuguese adapted versions.

Hospital Anxiety and Depression Scale (adaptation by McIntyre, Pereira, Soares, Gouveis, & Silva, 1999) consists of two subscales – one measuring anxiety and the other measuring depression – with seven items each, using a four point (0–3) response category. Hence, scores on both scales range between 0 and 21. On both subscales, a score of < 7 is interpreted as normal; between 8 and 10 borderline; and > 11 corresponding to a clinical diagnosis of anxiety and depression (Snaith & Zigmond, 1983). According to the authors, a cut-off threshold of 11 for depression or anxiety, means clinical depression or anxiety, respectively.

Illness Perception Questionnaire-Brief ((Broadbent, Petrie, Main, & Weinman, 2006) adapted version of Figueiras et al., 2009) assesses illness perceptions using a 10-point likert scale, in a total of eight items. Five of the items assess cognitive illness representations: consequences (1), timeline (2), personal control (3), treatment control (4), and identity (5). Two of the items assess emotional representations: concern (6) and emotions (8). One item assesses illness comprehensibility (7). Causal representation is answered in an open-ended response. High scores (total result) reveal a more threatening perception of the illness.

Sleepiness Apnea Quality of Life Index ((Flemons & Reimer, 1998) Portuguese version research of Sampaio, Pereira, & Winck 2008)) is a questionnaire, using a seven-point likert scale, designed as a disease-specific quality of life measure of people with OSAS. It has five domains, with the number of items following in parentheses: daily functioning (11); social interactions (13); emotional functioning (11); symptoms (5); and treatment-related symptoms (5) [not in use in this first evaluation moment]. The low end of scale reveals the least impairment (1–2), and the high end of scale reveals the greatest impairment (6–7).

Epworth Sleepiness Scale (adapted version from Center of Studies and Research in Health from Coimbra University) is a self-report questionnaire that evaluates the

probability of falling asleep in eight situations while “inactive in a public place,” “at work,” and “in a moving vehicle passenger or driver” (Johns, 1991). Subjects are asked to rate on a scale of 0–3 how likely they would fall asleep, and the global score ranges from 0 to 24. A total score higher than 17 suggests a severe daytime sleepiness and between 11 and 17 suggests a moderate daytime sleepiness (Johns, 1991).

Data analysis

To test differences between female and male patients on psychological and clinical variables, the multivariate analysis of variance (MANOVA) test was used and Qui-Square for daily somnolence were also employed. To test the relationship among all psychological variables for male and female patients, partial Pearson correlations were used for controlling illness severity.

Results

Sociodemographic characterization and clinic variables in female and male patients

The study included 111 patients, 78 men and 33 women. The mean age was 54.2 (SD = 7.36) for women and 52.77 (SD = 9.82) for men. The majority of the patients were married. Of these, 68.7% were females and 84.6% were males. In total, 66.7% of female patients had less or four years of education, which was significantly different ($\chi^2(1)$ df = 6.74, $p < 0.05$) from male patients (39.7%). Both female and male patients lived in the majority of cases, in an urban area, 68.2% for women and 69.2% for men. Almost half (45.5%) of female patients and 61.5% of male patients were employed. The majority of patients were obese. Female patients had a mean BMI of 36.45 (SD = 6.91) and male patients 33.17 (5.98).

AHI was about 39.33 (SD = 19.8) for women and 46.18 (SD = 16.92) for men and significantly different between female and male patients, and controlling for BMI ($F(1, 108) = 6.79$, $p < 0.01$). In total, 51.3% of male patients and 18% of female patients had hypertension. In all, 30% of female patients and 21% of male patients evaluate their somnolence as severe (Table 1).

Relationship among BMI, sleepiness, anxiety, depression, illness representation, quality of life in female and male OSAS patients controlling for OSAS severity

In female OSAS patients, anxiety and depression ($r = 0.469$, $p < 0.01$) and anxiety and illness representations ($r = 0.425$, $p < 0.5$) were positively correlated. Depression was also positively correlated with illness representations ($r = 0.493$, $p < 0.05$; Table 2). Quality of life was negatively correlated with anxiety ($r = -0.358$, $p < 0.05$), depression ($r = -0.588$, $p < 0.01$), and with illness representation ($r = -0.500$, $p < 0.01$) (Table 2). Daily somnolence was negatively correlated with quality of life ($r = -0.369$, $p < 0.05$) (Table 2).

In male OSAS patients, the results for correlations were in the same direction as female patients for all psychological variables, controlling for OSAS severity. Anxiety and depression ($r = 0.682$, $p < 0.01$), anxiety and illness representation ($r = 0.589$, $p < 0.01$), and depression and illness representation ($r = 0.410$, $p < 0.01$) were highly correlated (Table 3). Finally, quality of life was negatively correlated with depression ($r = -0.610$, $p < 0.01$), anxiety ($r = -0.688$, $p < 0.01$),

Table 1. Sociodemographic and clinical variables on female and male patients with OSAS.

Variables	Female (<i>n</i> = 33)		Male (<i>n</i> = 78)	
	<i>n</i> (%)	<i>M</i> (SD)	<i>n</i> (%)	<i>M</i> (SD)
Marital status	23 (69.7%)		66 (84.6%)	
Literacy	22 (66.7%)		31 (39.7%)	
	≤ 4 years education		≤ 4 years education	
Residence				
Rural	11 (33.3%)		24 (30.8%)	
Urban	22 (66.7%)		54 (69.2%)	
Professional status				
Employed	15 (45.5%)		48 (61.5%)	
Retired	10 (30.3%)		18 (23.1%)	
Unemployed	6 (18.2%)		8 (10.3%)	
Age		54.2 (7.36)		52.8 (9.82)
BMI (kg/m ²)		36.45 (6.91)		33.17(5.98)
AHI (events p/h)		39.33 (19.8)		46.18(16.92)
(BMI as a covariate)				
Hypertension	18 (54.5)		40 (51.3)	
Sleepiness	NS-9 (27)		NS-26 (33)	
	MS-14 (43)		MS-36 (46)	
	SS-10 (30)		SS-16 (21)	

Table 2. Relationships among clinical variables (AHI, BMI, and sleepiness) and psychological variables (anxiety, depression, illness representation, and quality of life) for female patients controlling for OSAS severity.

	ESS	Anxiety	Depression	IPQ	SAQLI
BMI					
Sleepiness					-0.369*
Anxiety			0.469**	0.425*	-0.358*
Depression		0.469**		0.493**	-0.588**
Illness representations		0.425*	0.493**		-0.500**
Quality life	-0.369*	-0.358*	-0.588**	-0.500**	

Note: ** $p < 0.01$, * $p < 0.05$.

illness representation ($r = -0.602$, $p < 0.01$), and also with daily somnolence ($r = -0.433$, $p < 0.01$) (Table 3). All Pearson correlation coefficients were similar, indicating that the all psychological variables indexes are comparable.

Differences between female and male patients on anxiety, depression, quality of life, and daily somnolence

The results for MANOVA tests (Table 4) revealed significant statistics differences between female and male OSAS patients in all psychological variables (Lambda de Wilks = 0.81; $F(6, 104) = 4.05$, $p < 0.001$). Female patients had significant levels of anxiety ($F = 14.37$, $p = 0.000$) and depression ($F = 11.54$, $p < 0.001$) symptoms when compared with male patients. Considering each domain of quality of life, a

Table 3. Relationships among clinical (AHI, BMI, and sleepiness) and psychological variables (anxiety, depression, illness representations, and quality of life) for male patients controlling for OSAS severity.

	Sleepiness	Anxiety	Depression	IPQ	SAQLI
Body mass index					
Sleepiness				0.411**	-0.433
Anxiety			0.682**	0.589**	-0.688**
Depression		0.682**		0.410**	-0.610**
Illness representations	0.411**	0.589**	0.410**		-0.602**
Quality life	-0.433**	-0.688**	-0.610**	-0.602**	

Note: ** $p < 0.01$, * $p < 0.05$.

Table 4. Differences between female and male patients with Sleep Apnea Obstructive Syndrome on Anxiety, Depression, Daily Functioning, Social Interactions, Emotional Functioning and Symptoms.

Variables	Female ($n = 33$),	Male ($n = 78$),	MANOVA,	
	M (SD)	M (SD)	F	p
Anxiety	11.61 (4.84)	8.10 (4.28)	14.37	0.000
Depression	8.27 (4.47)	5.58 (3.51)	11.54	0.001
Quality of life				
Daily Functioning	4.04 (1.48)	5.24 (1.48)	15.13	0.000
Social Interactions	4.67(1.22)	5.09 (1.27)	2.62	0.108
Emotional Functioning	3.53 (1.28)	4.44 (1.35)	11.05	0.001
Symptoms	2.39 (1.84)	3.49 (2.09)	6.81	0.010
Illness representations				
Consequences	6.88 (2.96)	4.54 (3.43)	3.42	0.001
Timeline	6.03 (2.88)	5.28 (3.19)	1.61	0.248
Personal control	5.00 (3.29)	5.03 (3.08)	-0.039	0.969
Treatment control	8.73 (2.04)	8.90 (1.87)	-0.427	0.670
Identity	7.58 (2.68)	4.86 (3.36)	4.12	0.000
Concern	7.85 (3.15)	7.77 (2.98)	0.126	0.900
Coherence	5.79 (3.18)	7.49 (2.88)	-2.75	0.007
Emotional representation	7.88 (3.24)	5.72 (3.47)	3.06	0.003

higher impairment in symptoms for both genders was found ($M = 2.39$ for female and $M = 3.49$ for male), and this difference was significant ($F = 6.81$, $p < 0.010$). The emotional domain was moderately impaired in female patients ($M = 3.53$) but not in male patients ($M = 4.44$), and this difference was significant ($F = 11.05$, $p < 0.001$). The domains of daily functioning and social interactions were not impaired for both genders despite existing significant differences between female and male patients on daily functioning ($F = 15.13$, $p = 0.000$) perceived as moderately impaired ($M = 4.04$) by female patients compared with male patients ($M = 5.24$). There are no differences between female and male patients on daily somnolence ($\chi^2(2)$ $df = 1.29$, ns) (Figure 1).

Finally, significant differences between female and male OSAS patients were found on consequences ($t(109) = 3.42$, $p < 0.01$), identity ($t(109) = 4.12$, $p < 0.01$), coherence ($t(109) = -2.75$, $p < 0.01$), and emotional representations ($t(109) = 3.06$, $p < 0.01$). Female patients tend to perceive OSAS as more

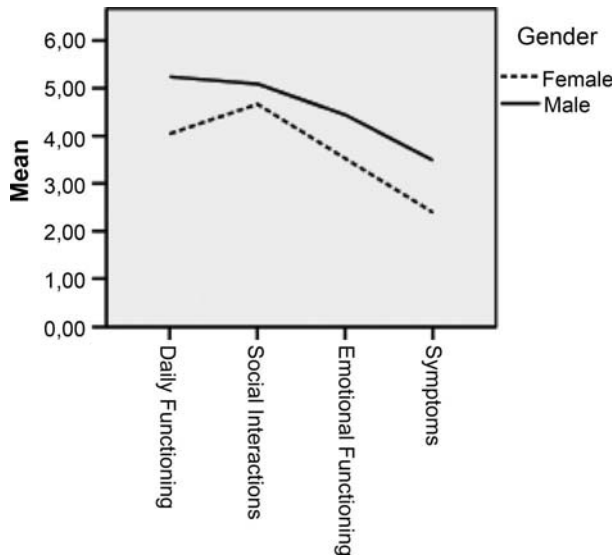


Figure 1. Mean results of quality of life scales for female and male patients.

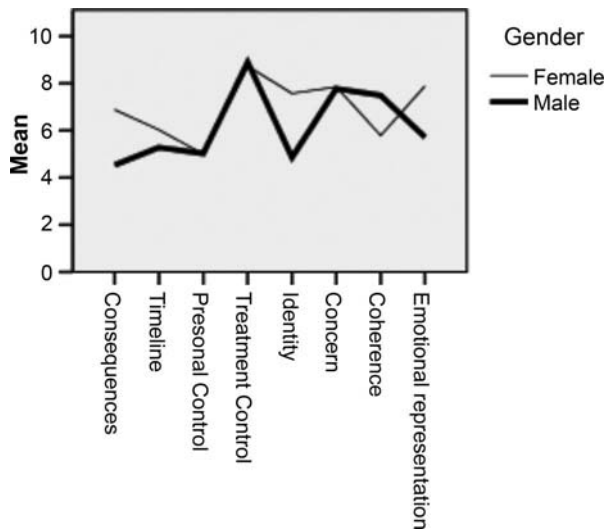


Figure 2. Mean results of illness representations for female and male patients.

threatening in all domains of illness representations compared with male patients (Figure 2).

Discussion

As it was described by Young et al. (1993), it is well known that OSAS is more common in men than in women. The reason for the apparent discrepancy between genders in clinical prevalence of OSAS is not clear (Dietlind et al., 2007). Some possible explanations have been suggested for Young et al. (1996), namely the

difference in clinical presentation, tolerance of symptoms, amount of medical services, bias created by the expectation of the attending physician of a higher prevalence of men with OSAS. The first difference to notice is the highest level of education in male patients, which represents the general tendency of Portuguese population (Instituto Nacional de Estatística (INE), I.P., 2010). Some studies pointed out that more women than men have $BMI \geq 30$ (Lin, Davidson, & Ancoli-Israel, 2008; Valipour et al., 2007). In our study, the severity of OSAS is higher in male patients, and this result is in accordance with the literature (Wahner-Roedler et al., 2007; Yukawa et al., 2009). We also found a positive relationship between severity of OSAS and BMI, and this result is in accordance with the literature (Dursunoğlu, Ozkurt, & Sarikaya, 2009; Wahner-Roedler et al., 2007).

No differences were found (Lin et al., 2008; Ye, Pien, & Weaver, 2009). between female and male patients on daily somnolence, and this result is also in accordance with the literature. Both male and female evaluated their somnolence in a moderate level, although the majority has a high AHI. It is well accepted that high somnolence is not a diagnosis of a particular sleep disorder (Johns, 1991). It is possible that the threshold at which women or men feel daytime sleepiness is lower and misunderstood as is fatigue. According to Dursunoğlu and Dursunoğlu (2007), Dursunoğlu et al. (2009) and Hahn and Staats (2004), women present frequently “atypical symptoms,” which generate uncertainty, e.g., fatigue, morning headaches, insomnia, depression, and great use of sedatives. The severity of sleep apnea is important and is related with all of the psychological variables measured, except for BMI recognized as an important variable for the diagnosis of sleep apnea. Therefore, it might be important when establishing the diagnosis of OSAS understand psychological morbidity, illness representations, and quality of life that seem to be impaired as a result of the disease, for both female and male patients. Additionally, clinicians need to be more vigilant regarding the presence of other psychological symptoms in their patients, mostly in female patients. In fact, as expected, a relationship between anxiety, depression, illness representations, and quality of life for both female and male patients was found, i.e., more anxiety and depression are related with less quality of life. In the same way, the more the disease is perceived as threatening, the lower is the quality of life. We also found a relationship between sleepiness and impaired quality of life for female OSAS patients. In male patients, a relationship was found between sleepiness, illness representations, and impaired quality of life. Perhaps when the patients perceive the main symptom of OSA that is somnolence, they represent their illness as more threatening and perceive their quality of life more impaired. BMI in males was also related to OSAS severity, which may act as a main factor for the increased prevalence of OSAS in male patients.

Depression has been well documented in various studies that underscore the existence of a complex relationship between depression and OSAS (Schröder & O'Hara, 2005). In a review conducted by Harris, Glozier, Ratnavadivel, and Grunstein (2009), despite a plethora of studies, there is no clear evidence of the role of OSAS in depression. In a study conducted by Cross et al. (2008), designed to determine whether brain alterations in OSAS bear relationships to depressive symptoms, the authors found depressive symptoms independent of the sleep disorder. Previous studies found that women had higher depression scores when compared with men (Dursunoğlu et al., 2009; Pillar & Lavie, 1998). In the present study, female patients showed borderline values for clinical depression, and male patients showed an absence of depression. Some experts argue that depression

measures are magnified by the predominantly physical symptoms that are present in depression. As a result, depressive symptoms may be an emotional reaction to a chronic medical illness diagnosis (Means et al., 2003). In our study, depressive symptoms were measured at the same moment as the diagnosis was provided, which may explain an absence of depression for male patients as a reaction to the diagnosis. Also the majority of male patients address for help due to their bed partners awareness of their apneic events (Dursunoğlu et al., 2009). Women tend to report frequently a number of unrelated sleep symptoms that can promote misdiagnosis of OSAS (Jordan & McEvory, 2003). In fact, depression and insomnia are intertwined and are both more common in females (Shepertycky, Banno, & Kryger, 2005). So, it is necessary to measure depressive symptoms in the first attendance in hospital settings and be sensitive to their importance on OSA diagnosis in female patients.

Reports of anxiety in the context of OSAS are less common than depression, and it seems that this relationship is still poorly understood (Kjelsberg, Ruud, & Stavem, 2005). In the present study, female patients have significantly higher anxiety symptoms compared with male patients, whose values are below clinical significance. As a whole, these anxiety symptoms are highly correlated with depression and illness perception. These data are confirmation of the Leventhal et al.'s self-regulation model (Moss-Morris et al., 2002) that postulates that cognitive illness perceptions are assimilated in parallel to emotional illness perceptions. As a result, as more illness symptoms are identified, the higher is the emotional response, like anxiety, depression and more impaired is the emotional functioning in quality of life, presented in female patients. This may also be related with a higher concern, with the illness, found in female patients. Furthermore, female patients tended to perceive OSAS as more threatening than male patients, revealed by the higher levels perceived in sleep apnea consequences, symptoms, emotional impairment, and lower perceived comprehensibility of illness. It is important to notice that we found only one study that used an interview focus on perceived effects and needs in general to comprehend how unthreatening patients with OSAS perceived their sleep situation and how the syndrome affected their life (Brostrom et al., 2007). Our study is the first that used a validated instrument specified to appraise illness perception – the IPQ-b.

OSAS clearly affects important domains of quality of life, which remain unexplored in the sleep laboratory. Quality of life per se has been an aim of many studies, and it has been measured mostly with generic illness measures (life SF-36) analyzing non-specific quality of life aspects (Ambrosio et al., 1999; Gonçalves et al., 2004). Less attention has been given to its particular impact in female and male patients. In a recent review, the authors state that gender differences in the functional status of OSA patients, which is a component of quality of life, have not been well investigated (Ye et al., 2009). In the present study, we use an illness-specific scale (SAQLI) designed to assess the impact OSAS on quality of life. We find out a medium impact in quality of life (total) described by female patients and a lower impact for male patients. In a report ascribed by Ye et al. (2009) that used functional outcomes sleep questionnaire, women reported lower perceived health status and poorer functional status measures compared with men. Specifying the domains of the scale, the differences between female and male patients were substantially, except for social interactions domain. Daily functioning domain is higher impaired in female patients than in male patients. It can be hypothesize that due to women being late diagnosed and received treatment later than men (Wahner-Roedler et al., 2007), they felt impaired in their daily functioning. The higher level of impairment was established in the symptoms domain for both genders, although for

female patients symptoms were significant higher than in male patients. This is the general tendency postulated in most studies that used SAQLI in OSAS patients (Mador, Krauza, Pervez, Pierce, & Braun, 2005; Siccoli et al., 2008). Curiously, the emotional domain was moderately impaired only in female patients, which is significantly different than male patients. This outcome may indicate a higher concern with sleep apnea by women and therefore an exacerbation of anxiety symptoms. Moreover, this result confirms the importance to look up at emotional response, namely depressive and anxiety symptoms, as a distinctive aspect to be evaluated in female OSAS patients. In this study, patients did not perceive the social interactions domain as problematic. Similarly, as it was found in other studies, our patients, both female and male, maintain a reasonable social functioning (Gonçalves et al., 2004). Dursunoğlu et al. (2009) pointed out the necessity to be aware of sleep apnea in women and the importance of referring women for sleep studies when they complain of symptoms associated with OSAS. Perhaps, the reality of undiagnosed women is changing and what cohort study (Young et al., 1997) mentioned (more than 90% women undiagnosed) is no longer true.

Limitations

Due to the prevalence of the OSAS, we had an unbalanced distribution in survey, which represents the normal ratio between female and male OSAS patients. Another limitation is the use of self-report measures.

Conclusion

The aim of our study was to understand how anxiety, depression, illness perception, and quality of life differ in female and male OSAS patients. Therefore, it seems extremely important to look at women as potential patients for sleep apnea. The investigation in this area emphasizes a pattern of symptoms well established that distinguish women from men. In fact, research in this field seems to rely on men as a norm to which women are compared. In the same way, the idea of a health care system ruled to gender is not new and is associated with multiple diseases, such OSAS. So it would be important to highlight unique factors in female OSAS patients to avoid inconsistent and sometimes false diagnosis of OSAS. For this purpose, it is necessary to integrate a domain of knowledge capable of evaluating variables that may have an impact on somatic complains. So it is extremely important to perceive how female and male patients cognitively and emotionally perceive their illness and be aware of the impact of these variables in coping with illness and adhering to its preferential treatment – CPAP.

Future investigations need to integrate several domains of knowledge to assess female and male patients as a distinct group of patients with specific needs and support. So, for future it is necessary to be aware of the psychological impairment in female OSAS patients and promote a multidisciplinary intervention capable to treat all important aspects of an illness with so many consequences.

References

- Ambrosio, C., Bowman, T., & Mohsenin, V. (1999). Quality of life in patients with obstructive sleep apnea effect of nasal continuous positive airway pressure—A prospective study. *Chest, 115*(1), 123–129.

- Bardwell, W., Ancoli-Israel, S., & Dimsdale, J. (2007). Comparison of the effects of depressive symptoms and apnea severity on fatigue in patients with obstructive sleep apnea: A replication study. *Journal of Affective Disorders*, *97*, 181–186.
- Bardwell, W., Berry, C., Ancoli-Israel, S., & Dimsdale, J. (1999). Psychological correlates of sleep apnea. *Journal of Psychosomatic Research*, *47*, 583–596.
- Broadbent, E., Petrie, K., Maina, J., & Weinman, J. (2006). The brief illness perception questionnaire. *Journal of Psychosomatic Research*, *60*, 631–637.
- Brostrom, A., Johansson, P., Stromberg, A., Albers, J., Martensson, J., & Svanborg, E. (2007). Obstructive sleep apnoea syndrome – Patients' perceptions of their sleep and its effects on their life situation. *Journal of Advanced Nursing*, *57*, 318–327.
- Cross, R., Kumar, R., Macey, P., Doering, L., Alger, J., Yan-Go, F., & Harper, R. (2008). Neural alterations and depressive symptoms in obstructive sleep apnea patients. *Sleep*, *31*(8), 1103–1109.
- Dietlind, L., Roedler, W., Olson, E., Narayanan, S., Sood, R., Hanson, A., ... Sood, A. (2007). Gender-specific differences in a patient population with obstructive sleep apnea-hypopnea syndrome. *Gender Medicine*, *4*, 329–338.
- Dursunoğlu, N., & Dursunoğlu, D. (2007). Do we neglect women with sleep apnea? *Maturitas*, *56*, 332–334.
- Dursunoğlu, N., Dursunoğlu, D., Özkurt, S., Kiter, G., & Evyapan, F. (2006). Gender differences in global cardiovascular risk factors of obstructive sleep apnea patients. *Tüberküloz ve Toraks Dergisi*, *54*, 305–314.
- Dursunoğlu, N., Ozkurt, S., & Sarikaya, S. (2009). Is the clinical presentation different between men and women admitting to the sleep laboratory? *Sleep Breath*, *13*, 295–298.
- Engleman, H., & Douglas, N. (2004). Sleepiness, cognitive function, and quality of life in obstructive sleep apnoea/hypopnoea syndrome. *Thorax*, *59*, 618–622.
- Figueiras, M., Marcelino, D., Claudino, A., Cortes, M., Maroco, J., & Weinman, J. (2009). Patients' illness schemata of hypertension: The role of beliefs for the choice of treatment. *Psychology and Health*, 1–11, iFirst article.
- Findley, L., & Suratt, M. (2001). Serious motor vehicle crashes: The cost of untreated sleep apnea. *Thorax*, *56*, 505.
- Flemons, W., & Reimer, M. (1998). Development of a Disease-specific Health-related Quality of Life Questionnaire for sleep apnea. *American Respiratory Critical Care Medicine*, *158*, 494–503.
- Flemons, W., & Reimer, M. (2002). Measurement properties of the Calgary sleep apnea quality of life index. *American Journal Respiratory Critical Care Medicine*, *165*, 159–164.
- Glebocka, A., Kossowska, A., & Bednarek, M. (2006). Obstructive sleep apnea and the quality of life. *Journal of Physiology and Pharmacology*, *57*, 111–117.
- Gonçalves, M., Paiva, T., Ramos, E., & Guilleminault, C. (2004). Obstructive sleep apnea syndrome, sleepiness, and quality of life. *Chest*, *125*, 2091–2096.
- Grotz, W., Büchner, N., Wessendorf, T., Teschler, H., Grote, L., Becker, H., & Rump, L. (2006). Sleep apnea-treatment improves hypertension. *Medizinische Klinik*, *101*, 880–885.
- Hahn, P., & Staats, B. (2004). Differences between men and women in sleep disordered breathing. *Journal Men's Health Gender*, *4*, 312–318.
- Harris, M., Glozier, N., Ratnavadivel, R., & Grunstein, R. (2009). Obstructive sleep apnea and depression. *Sleep Medicine Reviews*, *13*, 437–444.
- Instituto Nacional de Estatística, I.P. (2010). Homens e Mulheres em Portugal. Lisboa-Portugal.
- Jenkinson, C., Stradling, J., & Petersen, S. (1997). Comparison of three measures of quality of life outcome in the evaluation of continuous positive airways pressure therapy for sleep apnoea. *Journal of Sleep Research*, *6*, 199–204.
- Johns, M. (1991). A new method for measuring daytime sleepiness: The Epworth sleepiness scale. *Sleep*, *14*, 540–545.
- Jordan, S., & McEvory, D. (2003). Gender differences in sleep apnea: Epidemiology, clinical presentation and pathogenic mechanisms. *Sleep Medicine Review*, *7*, 377–389.
- Kjelsberg, F., Ruud, E., & Stavem, K. (2005). Predictors of symptoms of anxiety and depression in obstructive sleep apnea. *Sleep Medicine*, *6*, 341–346.
- Knauper, B. (2001). Symptom awareness and interpretation. In N.J. Smelser & P.B. Baltes (Eds.), *International encyclopedia of the social and behavioral sciences* (Vol. 23, pp. 15357–15362). Oxford: Elsevier.

- Krieger, J., Meslier, N., Lebrun, T., Levy, P., Joet, F., Saily, J., & Racineux, J. (1997). Accidents in obstructive sleep apnea patients treated with nasal continuous positive airway pressure. *Chest, 112*, 1561–1566.
- Leventhal, H., Meyer, D., & Nerenz, D. (1980). The common sense representation of illness danger. In S. Rachman (Ed.), *Medical Psychology* (Vol. 2, pp. 7–30). Nova Iorque: Pergamon Press.
- Lin, C., Davidson, T., & Ancoli-Israel, S. (2008). Gender differences in obstructive sleep apnea and treatment implications. *Sleep Medicine Reviews, 12*, 481–496.
- Mador, M., Krauzza, M., Pervez, A., Pierce, D., & Braun, M. (2005). Effect of heated humidification on compliance and quality of life in patients with sleep apnea using nasal continuous positive airway pressure. *Chest, 128*, 2151–2158.
- McArdle, N., Devereux, G., Heidarnafad, H., Eugleman, H., MarcKay, T., & Douglas, N. (1999). Long-term use of CPAP therapy for sleep apnea/hypopnea syndrome. *American Journal Respiratory Critical Care Medicine, 159*, 1108–1114.
- McIntyre, T., Pereira, M.G., Soares, V., Gouveis, J., & Silva, S. (1999). Escala de Ansiedade e Depressão Hospitalar. Versão Portuguesa de Investigação. Universidade do Minho. Departamento de Psicologia, Braga.
- McNicholas, W. (2008). *Diagnosis of obstructive sleep apnea in adults. Proceedings of American Thoracic Society, 5*, 154–160.
- Means, M., Lichstein, K., Edinger, J., Taylor, D., Durrence, H., Husain, A., . . . Radtke, R. (2003). Changes in depressive symptoms after continuous positive airway pressure treatment for obstructive sleep apnea. *Sleep and Breathing, 7*(1), 31–42.
- Moss-Morris, R., Weinman, J., Petrie, K., Horne, R., Cameron, L.D., & Buick, D. (2002). The revised illness perception questionnaire (IPQ-R). *Psychology and Health, 17*, 1–16.
- Moyer, C., Sonnad, S., Garetz, S., Helman, J., & Chervin, R. (2001). Quality of life in obstructive sleep apnea: A systematic review of the literature. *Sleep Medicine, 2*, 477–491.
- Mulgrew, A., Ryan, F., Fleetham, J., Cheema, R., Fox, N., Koehoorn, M., . . . Ayas, N. (2007). The impact of obstructive sleep apnea and daytime sleepiness on work limitation. *Sleep Medicine, 9*, 42–53.
- Ogden, J. (2004). *Psicologia da saúde*. Lisboa: CLIMEPSI Editores.
- Ohayon, M. (2003). The effects of breathing-related sleep disorders on mood disturbances in the general population. *Journal Clinical Psychiatry, 64*, 1195–1200.
- Parish, J., & Lyng, P. (2003). Quality of life in bed partners of patients with obstructive sleep apnea or hypopnea after treatment with continuous positive airway pressure. *Chest, 124*, 780–781.
- Petrie, K.J., & Pennebaker, J.W. (2004). Health related cognitions. In S. Sutton, A. Baum, & M. Johnston (Eds.), *The Sage handbook of health psychology* (pp. 127–142). New York: Sage.
- Pillar, G., & Lavie, P. (1998). Psychiatric symptoms in sleep apnea syndrome: Effects of gender and respiratory disturbance index. *Chest, 114*, 967–703.
- Sampaio, R., Pereira, M.G., & Winck, J.C. (2008). Sleepiness Apnea Quality of Life Index. Versão Portuguesa de Investigação. Universidade do Minho. Escola de Psicologia, Braga, Portugal.
- Sateia, M. (2009). Update on sleep and psychiatric disorders. *Chest, 135*, 1370–1379.
- Schröder, C., & O'Hara, R. (2005). Depression and obstructive sleep apnea (OSA). *Annals of General Psychiatry, 4*. doi:10.1186/1744-859X-4-13.
- Siccoli, M., Pepperell, J., Kohler, M., Craig, S., Davies, R., & Stradling, J. (2008). Effects of continuous positive airway pressure on quality of life in patients with moderate to severe obstructive sleep apnea: Data from a randomized controlled trial. *Sleep, 31*, 1551–1558.
- Shepertycky, M., Banno, K., & Kryger, M. (2005). Differences between men and women in the clinical presentation of patients diagnosed with obstructive sleep apnea syndrome. *Sleep, 28*, 309–314.
- Smith, E., & Shneerson, J. (1995). Is the SF-36 sensitive to sleep disruption? A study in subjects with sleep apnea. *Journal Sleep Research, 4*, 183–188.
- Tarasiuk, A., Greenberg-Dotan, S., Brin, Y.S., Tal, A., & Reuveni, H. (2005). Determinants affecting health-care utilization in obstructive sleep apnea syndrome patients. *Chest, 128*, 1310–1314.

- Terán-Santos, J., Jiménez-Gómez, A., Cordero-Guevara, J., & Cooperative Group Burgos-Santander (1999). The association between sleep apnea and the risk of traffic accidents. *The New England Journal of Medicine*, *340*, 847–851.
- The report of an American Academy of Sleep Medicine Task Force (AASM). (1999). Sleep-related breathing disorders in adults: Recommendations for syndrome definition and measurement techniques in clinical research. *Sleep*, *22*, 667–689.
- Valipour, A., Lothaller, H., Rauscher, H., Zwick, H., Burghuber, O., & Lavie, P. (2007). Gender-related differences in symptoms of patients with suspected breathing disorders in sleep: A clinical population study using the sleep disorders questionnaire. *Sleep*, *30*, 312–319.
- Wahner-Roedler, D., Olson, E., Narayanan, S., Sood, R., Hanson, A., Loehrerl, L., & Sood, A. (2007). Gender-specific differences in a patient population with obstructive sleep apnea-hypopnea syndrome. *Gender Medicine*, *4*, 329–338.
- Wolf, J., Lewicka, J., & Nartiewicz, K. (2007). Obstructive sleep apnea: An update on mechanisms and cardiovascular consequences. *Nutrition, Metabolism, and Cardiovascular Diseases*, *17*, 233–240.
- Yaggi, H., Concato, J., Kernan, W., Lichtman, J., Brass, L., & Mohsenin, V. (2005). Obstructive sleep apnea as a risk factor for stroke and death. *The New England Journal of Medicine*, *353*, 2034–2041.
- Ye, L., Pien, G., & Weaver, T. (2009). Gender differences in the clinical manifestation of obstructive sleep apnea. *Sleep Medicine*, *2*, 1000–1016.
- Young, T., Evans, L., Finn, L., & Patla, M. (1997). Estimation of the clinically diagnosed proportion of sleep apnea syndrome in middle-aged men and women. *Sleep*, *20*, 705–706.
- Young, T., Hutton, R., Finn, L., Badr, S., & Palta, M. (1996). The gender bias in sleep apnea diagnosis. Are women missed because they have different symptoms? *Archives Internal Medicine*, *156*, 2445–2451.
- Young, T., Palta, M., Dempsey, J., Skatrud, J., Weber, S., & Badr, S. (1993). The occurrence of sleep-disordered breathing among middle-aged adults. *The New England Journal of Medicine*, *328*, 1230–1235.
- Young, T., Peppard, P., & Gottlieb, D. (2002). Epidemiology of obstructive sleep apnea: A population health perspective. *American Journal Respiratory Critical Care Medicine*, *165*, 1217–1239.
- Yukawa, K., Inoue, Y., Yagyu, H., Hasegawa, T., Komada, Y., Namba, K., . . . Suzuki, M. (2009). Gender differences in the clinical characteristics among Japanese patients with obstructive sleep apnea syndrome. *Chest*, *135*, 337–343.
- Zigmond, A., & Snaith, R. (1983). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica*, *67*, 361–370.