Is severe obstructive sleep apnea associated with less depressive symptoms?

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INTRODUCTION

Obstructive sleep apnea (OSA) is a common sleep disorder characterized by recurrent cessation or reduction in airflow caused by upper airway collapse during sleep [1]. It is well known that depression is prevalent among patients with OSA [2].

Although the high prevalence of depression in patients with OSA suggest a direct causative link between OSA and depression, this association has not consistently been reported in the literature.

Subgroups of patients, such as those experiencing rapid eye movement–related and positional OSA, have demonstrated high levels of depression despite having a substantially milder degree of OSA [3,4]. Furthermore, a recent study [5] reported that increased severity of OSA was associated with less anxiety and depression. Therefore, further study is warranted to elucidate the connection between severity of OSA and symptoms of depression and anxiety.

The aim of the present study was to investigate this relationship in patients with newly diagnosed OSA.

METHODS

Patients were included if they were older than 18 years of age and had been diagnosed with OSA, defined as an AHI of ≥ 5/h, following a full-night polysomnography (PSG) (**Table 1**).

Symptoms of depression were assessed using the Beck Depression Inventory (BDI). The BDI scores ≥10 were considered to indicate the presence of depression.

Apnea severities measured using PSG were categorized into mild, moderate, and severe subgroups bounded by the 33rd and 66th percentiles of each parameter such as apnea-hypopnea index (AHI), respiratory distress index (RDI), and oxygen desaturation index (ODI), and minimal oxygen saturation (MinSaO2) (**Table 2**).

Independent relationships between the severity of OSA and symptoms of depression were assessed with multivariable analyses using binary logistic regression.

RESULTS

The study population comprised 795 patients (mean age 49.0 years, 86.9% males). The median AHI score was 25.0/h (interquartile range 12.5–42.0/h). The mean BDI scores were 10.1 (SD = 7.2). The BDI score was ≥ 10 in 367 patients (46.2%) (**Table 1**).

The prevalence of depressive symptoms was the highest (50.6 – 53.2%) in mild OSA patients and the lowest (40.8 – 42.0%) in severe OSA patients (Table 3). Mild OSA patients had an approximately 10% higher prevalence of depressive symptoms than those with severe OSA (**Table 3**).

In the crude analyses, patients with mild cases of OSA demonstrated more depressive symptoms (odds ratio [OR] 1.412~1.660, p < .05) than patients with severe cases of OSA, regardless of the categorizing method (**Table 4**), indicating that the prevalence of depressive symptoms is inversely associated with OSA severity. These findings remained statistically significant after controlling for age, sex, BMI, histories of hypertension and diabetes, ESS, total sleep time, and total arousal index as covariates. Patients with moderate OSA did not show any differences in depressive symptoms compared with patients who had severe OSA (**Table 4**).

Additionally, depressive symptoms were less common in patients with moderate OSA in comparison with patients with mild OSA when measured by AHI (OR 0.668, 95% confidence interval [CI] 0.467–0.956, p < .05) and ODI (OR 0.668, 95% CI 0.464–0.961, p < .05), but not when measured by RDI and MinSaO2 (p > .05).

RESULT TABLES

TABLE 1 Participant characteristics (n=795)

	Total (n=795)	No depression (n=428)	Depression (n=367)	p value
Age, years, mean (SD)	49.0 (11.9)	48.0 (11.9)	50.2 (11.7)	0.009
Male, n (%)	691 (86.9)	399 (93.2)	292 (79.6)	<0.001
BMI, kg/m^2, mean (SD)	26.0 (3.4)	25.9 (3.3)	26.0 (3.7)	NS
Hypertension, n (%)	266 (33.5)	131 (30.6)	135 (36.8)	0.066
Diabetes mellitus, n (%)	84 (10.6)	32 (7.5)	52 (14.2)	0.002
ESS, mean (SD)	9.7 (5.0)	9.1 (4.8)	10.3 (5.1)	0.001

TABLE 2 The boundaries of polysomnographic parameters categorizing severity of sleep apnea according to the 33rd and 66th percentiles of each parameter

	Mild OSA	Moderate OSA	Severe OSA
AHI, /h	5≤ and <17	17≤ and <35	≥35
RDI, /h	<26	26≤ and <42	≥42
ODI, /h	<14	14≤ and <30	≥30
MinSaO2, %	≥85	79≤ and <85	<79

TABLE 3 The prevalence of depressive symptoms depending on OSA severity (n=795)

	Mild OSA	Moderate OSA	Severe OSA
BDI ≥ 10, n (%)			
Defined by AHI	146 (53.1)	115 (43.9)	106 (41.1)
Defined by RDI	136 (50.6)	118 (45.9)	113 (42.0)
Defined by ODI	143 (53.2)	113 (48.1)	135 (41.7)
Defined by MinSaO2	134 (51.7)	125 (46.1)	108 (40.8)

TABLE 4 Logistic regression analyses with depressive symptoms as a dependent variable and OSA severity as covariate (n=795)

Compared to severe OSA	Crude model			Adjusted model[a]		
	OR	95% CI	p value	OR	95% CI	p value
Defined by AHI						
Mild	1.623	1.152 - 2.287	0.006	1.893	1.149 - 3.118	0.010
Moderate	1.122	0.792 - 1.589	0.52	1.244	0.798 - 1.939	0.34
Defined by RDI						
Mild	1.412	1.005 -1.984	0.047	1.561	0.923 - 2.638	0.10
Moderate	1.172	0.830 - 1.654	0.37	1.333	0.856 - 2.077	0.20
Defined by ODI						
Mild	1.660	1.179 - 2.338	0.004	1.872	1.167 - 3.004	0.009
Moderate	1.185	0.838 - 1.676	0.34	1.243	0.812 - 1.903	0.32
Defined by MinSaO2						
Mild	1.558	1.103 - 2.202	0.01	1.727	1.160 - 2.573	0.007
Moderate	1.245	0.884 - 1.752	0.21	1.287	0.888 - 1.865	0.18
Defined using clinical AHI cutoffs						
Mild	1.424	1.016 - 1.996	0.04	1.502	0.949 - 2.377	0.08
Moderate	1.297	0.925 - 1.818	0.13	1.311	0.860 - 1.998	0.21

AHI: apnea-hyponea index; CI: confidence interval; MinSaO$_2$: minimum arterial oxygen saturation; ODI: oxygen desaturation index; OR: odds ratio; OSA: obstructive sleep apnea; RDI: respiratory distress index.

[a]Adjusted by age, sex, body mass index, a score of Epworth Sleepiness Scale, total sleep time, total arousal index, the history of hypertension, and the history of diabetes mellitus

CONCLUSIONS

Depressive symptoms may be more prevalent in patients with mild OSA rather than those with severe OSA.

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