Acta Scientific NUTRITIONAL HEALTH (ISSN:2582-1423)

Volume 7 Issue 6 June 2023

Research Article

Prevalence of Obstructive Sleep Apnea in an Obese Patient with Other Comorbidities in PHCs; Riyadh, Saudi Arabia

Hussam Alzahrani*, Ahmed Alsomali and Mostafa Kofi

Family Medicine Resident, PSMMC, Riyadh, SA

***Corresponding Author:** Hussam Alzahrani, Family Medicine Resident, PSMMC, Riyadh, SA.

DOI: 10.31080/ASNH.2023.07.1248

Received: May 02, 2023

Published: May 18, 2023

Abstract

Background: Obstructive sleep apnea (OSA) is a chronic sleep-related disorder that afflicts a majority of obese patients. The current study aimed to evaluate the prevalence of OSA in obese patients with other comorbidities and to identify factors that may be associated with its progression.

Methods: A cross-sectional, observational study was conducted at the Alwazarat health care center (PSMMC) in Riyadh, Saudi Arabia. Participants were recruited from the center's chronic diseases clinic who were 18 years or older. All participants completed a questionnaire that included questions about their medical history, sleeping habits, and impact on routine functionality.

Results: A total of 337 participants were included in the study, with the majority of participants between the ages of 35 to 49 years (29.6%). The most common BMI range was 26-31, which was found in 111 individuals (32.9%) whereas 24.3% of participants had a 32-36 BMI range. The results showed that a total of 82 (24.3%) had at least one of the listed conditions including asthma, dyslipidemia, diabetes, heart disease, and thyroid disease. The most common comorbidity was diabetes which was diagnosed in 108 individuals (32.0%). The incidence of multiple conditions, with the most common combination being diabetes and asthma, was diagnosed in 18 individuals (5.3%). In response to snoring, 263 (78%) answered yes, 68 (20.2%) answered no, and 6 (1.8%) responded that they don't know. Concerning the extent of snoring, 70 (20.8%) reported their snoring as loud as talking, 14 (4.2%) responded that it was louder than talking, and 188 (55.8%) felt it was slightly louder than breathing. The majority of participants reported rarely or never experiencing instances of interrupted breathing during sleep. A high proportion of participants reported having high blood pressure (50.1%).

Conclusions: The results of this study suggest a significantly high prevalence of OSA in obese patients with multiple comorbidities.

Keywords: Obstructive Sleep Apnea; Obesity; Hypertension; Diabetes Mellitus; Cardiovascular Risk

Introduction

Obstructive sleep apnea (OSA) is a chronic sleep-related disorder characterized by repetitive episodes of apnea and hypopnea during sleep [1,2]. It occurs as a consequence of the dynamic collapse of upper airway tissues for more than ten seconds which leads to hypoxemia and hypercapnia [3]. Generally, OSA is manifested as snoring, oxygen desaturations, and brief arousal from sleep [4]. Common symptoms of OSA include daytime sleepiness, nocturia, somnolence, and persistent fatigue [5]. Due to the pronounced impact on functionality, OSA patients manifest a poor quality of life compared to their healthy counterparts [6]. Afflicted individuals generally demonstrate no issues during wakefulness but are prone to upper airway blockage during sleep [7]. Relating to upper airway obstruction, OSA commonly occurs in the oropharynx and hypopharynx regions of the respiratory tract. OSA impacts millions of individuals across the globe with some estimates suggesting that the overall number is close to one billion [8]. Despite the growing prevalence of OSA, over 80%individuals with moderate to severe disease remain undiagnosed. OSA has emerged as an independent risk factor for hypertension and various cardiovascular disorders (CVDs) such as cardiac arrhythmia, heart attack, etc. [9]. OSA is frequently associated with various comorbidities including obesity, CVDs, and diabetes. The incidence of multiple comorbidities worsens the prognosis in OSA patients [10].

Obesity is the major contributor to the progression of OSA, primarily attributed to increasing adiposity in obese individuals [11]. BMI is a frequently used parameter to measure obesity. Usually, a BMI≥ 30 indicates obesity whereas BMI≥ 25 is used for overweight [12]. The prevalence of OSA is higher in obese individuals, and it is estimated that up to 60-90% of individuals with OSA are obese [13]. The mechanism of association between OSA and obesity is multifactorial as changes in lifestyle in OSA patients such as daytime somnolence and decreased physical activity can lead to obesity [14]. Obesity, on the other hand, can lead to OSA due to fat deposition in upper airway tissues which hinders their normal functioning [15]. Another probable mechanism behind OSA can be rooted in endocrine dysregulation mainly due to the leptin hormone produced by adipocytes [16,17]. An increased presence of leptin in obese patients impacts chemoreflex function in the upper respiratory tract [18]. Male obese patients with OSA manifest 50% higher plasma leptin levels compared to obese control patients without OSA [19]. A population-based study demonstrated that a 10% weight gain was associated with a 6-fold increase in the odds of the development of OSA [20]. Similarly, weight loss was significantly associated with decreased frequency of OSA in other studies [21,22]. There is a growing body of evidence indicating that the management of OSA in obese individuals requires a multifaceted approach that includes weight loss, lifestyle modifications, and pharmacotherapy [7,23]. However, the optimal management of OSA in obese individuals with comorbidities remains a challenge, and there is a need for further research to identify effective treatment strategies.

This study aimed to evaluate the prevalence of OSA in obese patients with other comorbidities and to identify factors that may be associated with the development of OSA in the Saudi population. This study will provide valuable insights into the prevalence and risk factors for OSA in obese individuals with comorbidities and will oave way for the development of more effective treatment strategies for this population.

Methodology

Study design and population

This cross-sectional, observational study was conducted at the Alwazarat health care center (PSMMC), Riyadh Saudi Arabia. Participants were recruited from the center's chronic diseases clinic. All individuals aged 18 years and above irrespective of their nationalities were eligible for inclusion in the study. Age less than 18 years and those with communication problems or unwilling to participate were excluded from the study.

Data collection

A systematic random sampling technique was used to reach the targeted participants. Data was collected by using a self-administered questionnaire. Each participant was asked to read and sign a consent form, before the start of data collection. All participants completed a questionnaire that included questions about their medical history, sleep habits, and impact on routine functionality.

Ethical consideration

Informed consent was obtained from all study participants. This included providing individuals with information about the study, including its purpose, procedures, and potential risks and benefits. Participants were given the opportunity to ask questions and to decline participation if they so choose. Confidentiality was strictly maintained throughout the study. The study was approved by the Institutional Review Board (IRB) committee of PSMMC.

Statistical analysis

The data was analyzed using Microsoft Excel and SPSS software. Data was cleaned and entered into SPSS and analyzed for frequency, means, and chi-square or t-test for significance. A P-value less than 0.05 was considered significant.

Results

Demographic information

Of 337 participants analyzed in the study, 67.1% were male (Table 1) and the majority of participants were between the ages of 35 to 49 years (29.6%) (Figure 1).

The most common BMI range was 26-31, which was found in 111 individuals (32.9%) whereas 24.3% of participants had a 32-36 BMI range. There were also a smaller number of individuals with BMIs in the 20-25 range (8.6%) and in the 20-26 and 26-32 ranges (3% and 6.2% individuals, respectively) whereas 6 (1.8%) participants had a BMI of unknown range (Table 2).

Gender					
		Frequency	Percentage (%)	Valid (%)	Cumulative (%)
Valid	Female	111	32.9	32.9	32.9
	Male	226	67.1	67.1	100
	Total	337	100	100	

Table 1: Gender (%) of participants

Comorbidities

The data showed that a total of 82 (24.3%) had at least one of the listed conditions including asthma, dyslipidemia, diabetes, heart disease, and thyroid disease. The most common individual condition was diabetes, which was diagnosed in 108 individuals (32.0%). The incidence of multiple conditions, with the most common combination being diabetes and asthma, was diagnosed in 18 individuals (5.3%). The presence of rare combinations of conditions, such as heart disease, thyroid disease, diabetes, asthma, and dyslipidemia, was observed in 2 individuals (0.6%) (Figure 2).

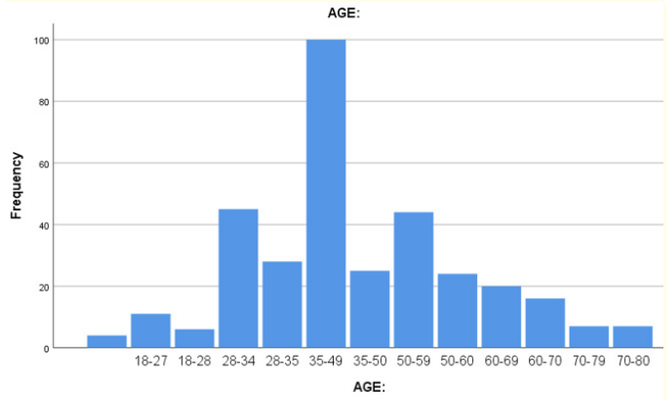

Figure 1: Age distribution of participants.

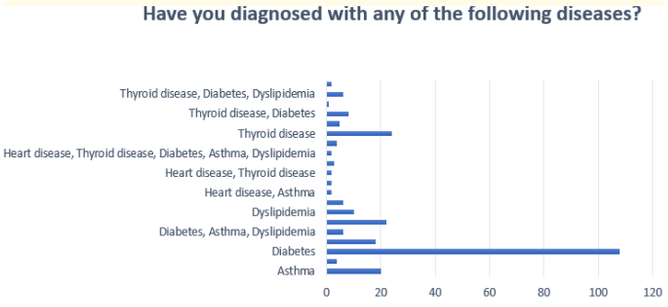

Figure 2: Incidence of comorbidities in participants.

		Frequency	Percentage	Valid (%)	Cumulative (%)
Valid		6	1.8	1.8	1.8
	20-25	29	8.6	8.6	10.4
	20-26	10	3.0	3.0	13.4
	26-31	111	32.9	32.9	46.3
	26-32	21	6.2	6.2	52.5
	32-36	82	24.3	24.3	76.9
	32-37	26	7.7	7.7	84.6
	37+	52	15.4	15.4	100.0
	Total	337	100.0	100.0	

Table 2: BMI characteristics of participants.

Snoring in participants

The analyzed results concerning snoring revealed that out of 337 total respondents, 263 (78%) answered yes, 68 (20.2%) answered no, and 6 (1.8%) responded that they don't know (Table 3).

Further, among participants who responded positively, 70 (20.8%) reported their snoring as loud as talking, 14 (4.2%) responded that it was louder than talking, and 188 (55.8%) reported slightly louder than breathing (Table 4).

		Frequency	Percentage (%)	Valid (%)	Cumulative (%)
Valid	Don't know	6	1.8	1.8	1.8
	NO	68	20.2	20.2	22.0
	Yes	263	78.0	78.0	100.0
	Total	337	100.0	100.0	

Table 3: Response to question "do you snore?".

		Frequency	Percentage	Valid (%)	Cumulative (%)
Valid		70	20.8	20.8	20.8
	As loud as talking	65	19.3	19.3	40.1
	Louder than talking	14	4.2	4.2	44.2
	Slightly louder than breathing	188	55.8	55.8	100.0
	Total	337	100.0	100.0	

Table 4: Severity of snoring in participants.

Concerning the frequency of snoring, 50 (14.8%) reported that they do not know how often they snore, 32 (9.5%) revealed that they snore 1-2 times per month, 70 (20.8%) reported that they snore 1-2 times per week, 66 (19.6%) said that they snore 3-4 times per week, whereas 71 (21.1%) believed that they snored almost every day. A total of 48 (14.2%) reported that they rarely or never snore (Figure 3).

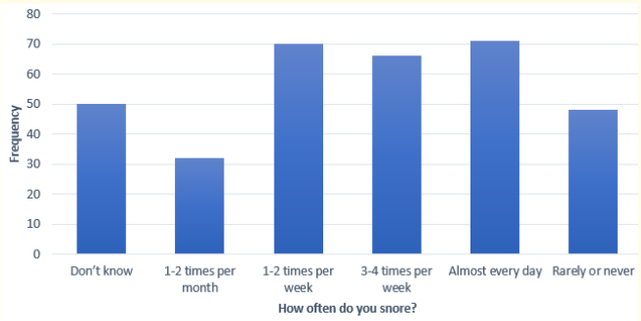

Figure 3: How often participants snored?

Regarding the summary of the extent to which the snoring of individuals who answered "yes" to the question of whether or not they snore, has bothered other people. 38 (11.3%) reported that they do not know, 86 (25.5%) shared that it has not whereas 130 (38.6%) felt that it does (Table 5).

		Frequency	Percentage	Valid (%)	Cumulative (%)
Valid	Don't know	38	11.3	11.3	11.3
	NO	86	25.5	25.5	61.4
	Yes	130	38.6	38.6	100.0
	Total	337	100.0	100.0	

Table 5: Response to question "has your snoring bothered anyone?"

Concerning instances of interrupted breathing during sleep, 22 (6.5%) shared that they do not know how often this has occurred, 54 (16.0%) reported that it has occurred 1-2 times per month, 28 (8.3%) reported that it has occurred 1-2 times per week, 22 (6.5%) believed that it has occurred 3-4 times per week whereas the daily incidence of interrupted breathing and rarely or never occurred was responded by 3.9% and 58.8%, respectively (Figure 4).

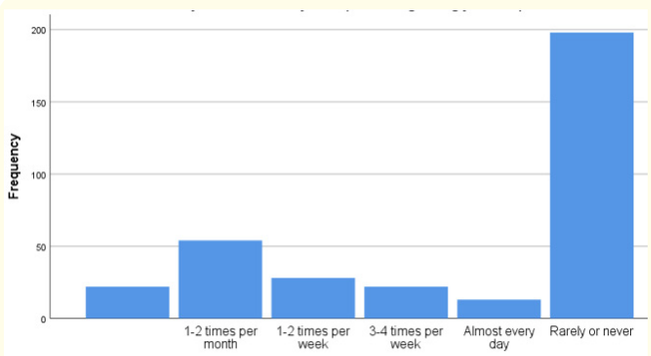

Figure 4: Incidence of stopped breathing in sleep.

Impact on functionality

The results showed that 3.2% of the individuals reported feeling tired or fatigued every day, 17.7% of the individuals reported feeling tired or fatigued 1-2 times per month, 22.4% of the individuals responded feeling tired or fatigued 1-2 times per week, 20.1% of the individuals felt tired or fatigued 3-4 times per week, whereas 15.6% of the individuals believed that they were tired or fatigued almost every day, and 20.6% of the individuals reported rarely or never feeling tired or fatigued (Fig 5). In response to the impact on work performance, 2.4% of respondents reported feeling tired, fatigued, or not up to par all the time during their waking hours. Around 20.8% reported feeling this way 1-2 times per month, 19.9% reported feeling this way 1-2 times per week, 22.8% reported feeling this way 3-4 times per week, 15.1% reported feeling this way almost every day, and 19% reported rarely or never feeling this way (Table 6).

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Don't know	8	2.4	2.4	2.4
	1-2 times per month	70	20.8	20.8	23.1
	1-2 times per week	67	19.9	19.9	43.0
	3-4 times per week	77	22.8	22.8	65.9
	Almost every day	51	15.1	15.1	81.0
	Rarely or never	64	19.0	19.0	100.0
	Total	337	100.0	100.0	

Table 6: During your waking time, do you feel tired, fatigued or not up to par?

Further, 30% of respondents reported nodding off or falling asleep while driving a vehicle whereas 65.9% never experience this (Figure 5).

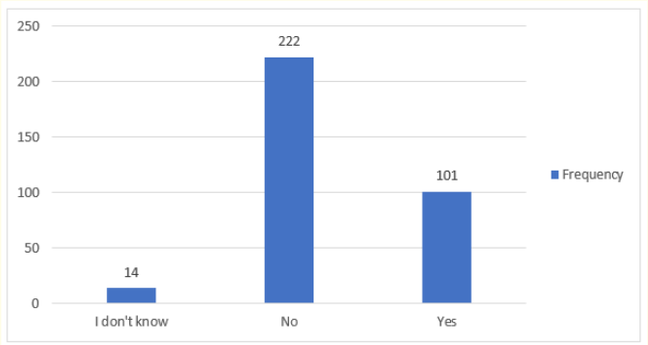

Figure 5: Have you ever nodded off or fallen asleep while driving a vehicle?

Out of the respondents who reported nodding off or falling asleep while driving a vehicle, 48.1% answered "I don't know" how often it occurs, 8% reported it occurs 1-2 times per month, 4.7% reported it occurs 1-2 times per week, 5.3% reported it occurs 3-4 times per week, 3.6% reported it occurs almost every day, and 30.3% reported it rarely or never occurs (Figure 6).

The data includes 6 (1.8%) reporting that they do not know whether or not they have high blood pressure, 36 (10.7%) reporting that they do not, 126 (37.4%) reporting that they do, and 169 (50.1%) reporting that they do (Figure 7).

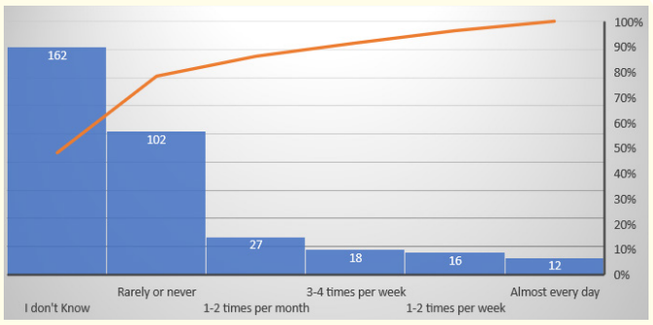

Figure 6: How often do you nodd off or fallen asleep while driving a vehicle.

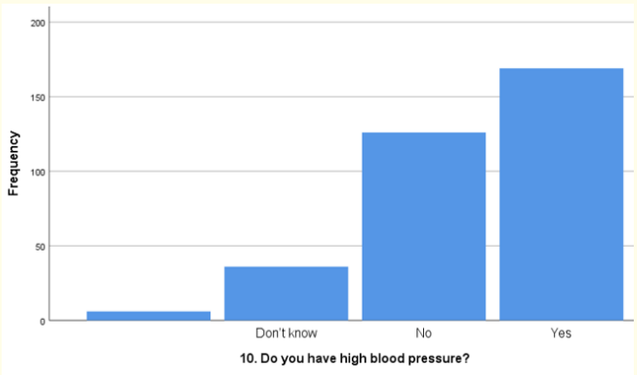

Figure 7: Do you have blood pressure?

The probability value of the current results was less than the alpha value which indicates significance (Table 7).

Variable		value	df	Asymptotic Significance (2-sided)
1. Do you snore	Pearson Chi-Square	15.515a	2	0.000
5. Has anyone noticed that you stop breathing during your sleep?	Pearson Chi-Square	18.504[a]	5	0.002
6. How often do you feel tired or fatigued after your sleep	Pearson Chi-Square	379.006[a]	18	0.000
8. Have you ever nodded off or fallen asleep while driving a vehicle	Pearson Chi-Square	23.185[a]	2	0.000
10. Do you have high blood pressure?	Pearson Chi-Square	9.142[a]	3	0.027

Table 7: Inferential analysis.

Discussion

Obstructive sleep apnea (OSA) is becoming increasingly common worldwide due to the evergrowing prevalence of obesity [24]. The present study determined the frequency of OSA in obese patients among the Saudi population who also had other comorbid conditions. Several previous studies have evaluated the incidence of OSA and the presence of different comorbidities [25-28]. Similar to our study, Pinto., *et al*. reported several comorbidities including hypertension, obesity, depression, diabetes, and asthma in OSA patients [25]. The incidence of hypertension in their study was 39% which was close to our findings. Significant evidence demonstrates that people with OSA and obesity have a higher incidence of hypertension [29,30]. Similarly, a retrospective study by Sweed., *et al*. reported different comorbidities associated with OSA [31]. They also reported a higher incidence of comorbid conditions such as obesity, hypertension, and diabetes. Our findings indicated the incidence of multiple comorbidities which were in line with Papachatzakis., *et al*. [32]. Their findings indicated that OSA patients suffered from 1 - ≥ 4 conditions. The majority of participants in this study were in the age range of 35 to 49 years old. This aligns with the findings of the HypnoLaus study, which reported an average age of 40 years old with a standard deviation of 15.89 years for their participants [33]. This suggests that middle-aged individuals in Lebanon are at risk for OSA, and may also have other health issues.

The study found that 32% of participants had diabetes and 7.1% had thyroid illness, in addition to other underlying disorders. However, 58.8% of the participants were not aware that they had OSA, indicating a low prevalence of the condition. This finding is consistent with another study, the Wisconsin Sleep Cohort Study which also found that the prevalence of OSA was higher in middle-aged individuals and that many individuals had comorbidities such as diabetes and hypertension [34]. Additionally, the study reported that OSA is underdiagnosed, with a majority of the sufferers not being aware of the condition. The high incidence of obstructive sleep apnea (OSA) is evident from the fact that 50.1% of the participants in this study had hypertension. In current, most participants responded that they frequently snored. Snoring is the most common symptom of OSA which occurs in around 70-95% of patients [35]. Managing blood pressure may help reduce the incidence of OSA. The most effective treatment for OSA is continuous positive airway pressure (CPAP) therapy, and it is crucial for patients to use it as recommended daily. If the condition does not improve with CPAP therapy, surgery may be considered as an alternative option. A study by the American Academy of Sleep Medicine found that CPAP therapy is indeed the gold standard treatment for OSA, and that it effectively improves the symptoms and quality of life of OSA patients [36]. In addition, the study also highlighted that surgery can

be considered as an alternative treatment for OSA in cases where CPAP therapy is not effective or well-tolerated.

Conclusion

Obstructive sleep apnea is a frequently reported sleep disorder in obese patients which is characterized by repetitive episodes of upper airway obstruction during sleep. Obesity (BMI≥ 30), by deposition of fat in the upper airway, leads to alternation in normal function which hinders breathing. Our study demonstrated several comorbidities including asthma, dyslipidemia, diabetes, heart disease, and thyroid disease, with diabetes being the most common of all. The study also found that a significant number of participants reported snoring frequently, with more than half reporting snoring at least once per week. A significant number of participants also reported that their snoring had bothered others. In line with other OSA studies, we observed a high proportion of participants suffering from hypertension. Our study confirmed previous findings that OSA is highly prevalent sleep disorder in obese patients.

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