



Beyond Snoring: Evaluating Treatment Approaches and Severity in Obstructive Sleep Apnea

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A B S T R A C T

Background: Obstructive sleep apnea (OSA) is a prevalent sleep disorder characterized by recurrent upper airway obstructions during sleep, leading to disrupted breathing and significant health risks. The condition is increasingly common, particularly among older adults, men, and postmenopausal women, with contributing factors such as age, lifestyle, and comorbidities. Effective management of OSA includes treatment options such as CPAP, BiPAP, lifestyle modifications, and surgical interventions. However, patient adherence and follow-up remain significant challenges.

Objectives: This study aims to evaluate treatment modalities for OSA at Lady Reading Hospital Peshawar, including CPAP, BiPAP, lifestyle modifications, and surgical interventions. It also seeks to compare treatments across different OSA severity categories and examine the prevalence of mild, moderate, and severe OSA in the population.

Methodology: A retrospective study was conducted on 66 patients diagnosed with OSA based on polysomnography at the Department of Pulmonology, Lady Reading Hospital, between 2022 and 2023. Demographic data, comorbid conditions, symptom duration, and treatment modalities were analyzed. Severity was assessed using the Apnea-Hypopnea Index (AHI). Descriptive statistics and Chi-Square tests were used to examine treatment distribution, adherence, and follow-up.

Results: Most patients were aged 41-70 (81.82%), with moderate OSA (43.94%) being the most common severity. CPAP was prescribed to 39.39%, and BiPAP to 18.18%. Treatment adherence was low, with 5 patients lost to follow-up, and 7 refusing CPAP/BiPAP.

Conclusion: The study highlights the challenges of treatment adherence in OSA management. It underscores the need for better patient education, follow-up, and strategies to improve long-term outcomes for OSA patients.

Keywords: Apnea; Apnea-Hypopnea Index; Mandibular Advancement Device; Mandibular Repositioning Appliance; Obstructive Sleep Apnea; Snoring

Introduction

Sleep is the cornerstone process for the health of the brain and body, which fuels memory, steadies mood, and shields against chronic ailments like diabetes, hypertension, and ischemic heart diseases.^{1,2} As we drift off to Sleep, our awareness alters dampening our senses and inhibiting muscular activity.³ Obstructive sleep apnea, (OSA) stands out as the most prevalent sleep disorder disrupting this vital process. Characterized by recurrent episodes of partial or complete upper airway obstruction during sleep, OSA disrupts normal breathing patterns and can have significant health consequences.⁴ Obstructive sleep apnea is more prevalent in older adults due to weakened throat muscles attributed to aging. Men and postmenopausal women are also at higher risk. Certain medical conditions like neuromuscular disorders and medications that relax airway muscles or affect breathing control can contribute to OSA.⁵ Risk factors extend to dental health, with edentulism affecting airway anatomy and function. Studies reveal a positive correlation between edentulism and the prevalence of obstructive sleep apnea. This association can be attributed to several anatomical and physiological changes within the oral cavity following tooth loss.⁶⁻⁸ Lifestyle choices like smoking and alcohol consumption can worsen OSA in susceptible individuals.⁹ Obstructive sleep apnea disrupts sleep quality and presents with a range of daytime and nighttime symptoms. These include labored breathing or gasping during sleep, difficulty remembering dreams, and excessive sleepiness throughout the day despite adequate sleep duration. Cognitive function can also be affected, leading to problems with attention, concentration, and decision-making.¹⁰ Additionally, OSA has been linked to nighttime bedwetting, morning headaches, and increased irritability or depression. Chronic mouth breathing during sleep can cause dryness, while daytime sleepiness and fatigue can negatively affect work performance and social interactions. OSA can be attributed to excessive muscular relaxation causing airway collapse, turbulence and snoring. With the principles of Venturi effect, collapse worsens and triggers arousals with gasping to resume breathing. OSA severity correlates with the frequency of these events, negatively affecting daytime sleepiness and health.¹¹

The definitive diagnosis of OSA relies on polysomnography. This multi-parameter assessment objectively evaluates sleep architecture, respiratory events, and oxygen saturation levels.¹² While daytime fatigue is a prevalent symptom of OSA, it can also be associated with other medical conditions. The diagnostic criteria for obstructive sleep apnea (OSA) require the presence of at least one of the following findings observed during sleep. Firstly, snoring is often noted as a key indicator. Additionally, there may be a reduction in airflow through

the oropharyngeal and nasopharyngeal passages, which suggests an obstruction or narrowing in these areas. Another critical sign is paradoxical thoracoabdominal breathing, which occurs during apneic episodes, indicating an abnormal respiratory effort despite blocked airflow.¹³ Polysomnography is thus an essential tool for confirming the diagnosis of OSA and distinguishing it from other sleep disorders. Various treatment modalities are available to manage OSA, each aiming to improve symptoms and overall health outcomes. Broadly, these treatments include lifestyle modifications, the use of mandibular advancement appliances, continuous positive airway pressure (CPAP) therapy, and upper airway management through surgical interventions.¹⁴

The rationale for this study lies in the growing recognition of obstructive sleep apnea (OSA) as a significant health issue with widespread implications, yet gaps remain in understanding the treatment modalities and patient follow-up in real-world settings. While various therapies, including CPAP, BiPAP, lifestyle changes, and surgical interventions, are employed to manage OSA, there is a need to evaluate their distribution across different severity levels and identify the challenges faced in patient adherence and follow-up. This study seeks to fill this gap by assessing the current management strategies for OSA, analyzing their effectiveness across different severity categories, and investigating the prevalence of mild, moderate, and severe cases within the patient population. By doing so, the study aims to provide valuable insights into optimizing OSA management and improving patient outcomes, especially in populations at higher risk.

Objective

The objective of this study is to examine the treatment modalities employed for OSA in patients at the study setting, including CPAP, BiPAP, lifestyle modifications, and to identify cases lost to follow-up. Additionally, the study aims to compare how these treatments are distributed across different OSA severity categories. Lastly, it seeks to investigate the prevalence of mild, moderate, and severe OSA within this population.

Methodology

This retrospective study was conducted at the Department of Pulmonology, Lady Reading Hospital Peshawar, and involved a comprehensive analysis of the medical records of 66 patients diagnosed with obstructive sleep apnea (OSA) based on polysomnography. The study included patients aged 18-70 years who were diagnosed with OSA during the period between 2022 and 2023. The selection of participants was based on the availability of complete medical records, including diagnostic polysomnography results, treatment history,

Table 1. Baseline characteristics of study cases

Variable	Frequency (%)
Age	
18-40 years	12 (20.0)
41-70 years	54 (80.0)
Gender	
Male	31 (51.7)
Female	35 (48.3)
BMI	
More than 30	40 (66.7)
Up to 30	26 (33.3)
Duration of symptoms	
≤ 3 months	14 (23.4)
> 3 months	52 (76.6)
Comorbid	
Yes	41 (68.4)
No	25 (31.6)
Severity	
Mild	22 (36.7)
Moderate	29 (48.4)
Severe	15 (14.9)

and follow-up data. Patients with incomplete medical records or those diagnosed with other sleep disorders were excluded from the study.

The demographic data collected included age, gender, body mass index (BMI), and the presence of comorbid conditions such as hypertension, diabetes mellitus, and ischemic heart disease. The duration of symptoms and relevant medical history, such as smoking and alcohol consumption, were also recorded. Polysomnographic parameters, including the Apnea-Hypopnea Index (AHI), were used to classify the severity of OSA into mild, moderate, or severe categories. The study also reviewed

treatment modalities used for managing OSA, including Continuous Positive Airway Pressure (CPAP), Bilevel Positive Airway Pressure (BiPAP), lifestyle modifications (such as weight management and smoking cessation), and surgical interventions (e.g., uvulopalatopharyngoplasty). Furthermore, data regarding patient follow-up and adherence to prescribed treatments were gathered to assess any challenges or issues related to long-term management.

Descriptive statistics were applied to summarize the demographic characteristics, severity of OSA, and the distribution of treatment modalities. The Chi-Square test

Table 2. Treatment modalities of study cases

Treatment modalities	Frequency (%)
Life style modification and weight loss	10 (16.6)
CPAP	26 (43.4)
BIPAP	12 (20.0)
Lost to follow up	5 (8.4)
Treatment Refusal	4 (6.6)
Prosthodontic referrals	3 (5.0)

was utilized to examine the association between categorical variables such as treatment modality and OSA severity, as well as the relationship between patient demographics and the likelihood of being lost to follow-up. The data were analyzed using SPSS software version 20 to determine the statistical significance of these relationships. Ethical approval for the study was obtained from the hospital's ethical review board, and all patient data were anonymized to ensure confidentiality and protect patient privacy.

Results

The age distribution among 66 patients was analyzed as 12(18.18%) patients were 18-40 years old, and 54(81.82%) were in the 41-70 age range. Gender distribution among patients was analyzed and 31(46.97%) were male, 35 (53.03%) were female. Duration of symptoms in 14 (21.21%) patients was lesser than 3 months and in 52 (78.79%) patients' symptoms were of more than 3 months duration. 41(62.12%) patients had no comorbid. The severity of disease was assessed according to AHI. 22 (33.33%) patients had AHI in the range of 0-15, 29 (43.94%) patients were graded with moderate severity and 15 (22.73%) patients had severe disease (Table 1). Following the polysomnography 26(39.39%) patients were started on CPAP according to the titration results and 12 (18.18%) patients were advised BIPAP. Out of 28 left over patients 5 were lost to follow up, 12 patients were advised life style modification and follow up, 7 patients needed CPAP/BIPAP intervention but refused to opt any treatment (Table 2).

Discussion

Our study sheds light on the characteristics and treatment patterns of obstructive sleep apnea (OSA) patients in a private study setting. Our analysis of 66 patients revealed interesting trends. The age distribution was diverted

towards the 41-70 age range, aligning with established knowledge of OSA prevalence. Similar relation was established in a study on global prevalence and burden of OSA.¹⁵ Notably, the gender distribution was nearly equal contrary to its established prevalence in the male gender more than females.^{16,17} While our sample size was limited, and strong conclusions on gender can be withdrawn after future studies by overcoming the limitations. The lengthy symptom duration gives a clue about potential delay in the diagnosis. This underscores the importance of educating masses about OSA symptoms to facilitate earlier detection and intervention.

In our results, a significant portion of the population had no reported comorbidities. This could indicate under-reporting of existing conditions or the need for more comprehensive comorbidity assessments because OSA has been linked with comorbid conditions frequently and birectionally.¹⁸ In addition, Obesity is identified as an independent risk factor for OSA and our study findings were similar to the opinion made by Marjin et al addressing the OSA and hypertension. Our study revealed that 60% had BMI of more than¹⁹The severity distribution highlighted a notable number of moderate OSA cases, highlighting the need for a diverse treatment approach catering to varying severities. CPAP emerged as the most common treatment, followed by BiPAP, reflecting their effectiveness in managing OSA.¹⁷ Our study findings correlate with another study amongst Singaporean patients highlighting the significant prevalence of OSA across various severities (mild: 21.4%, moderate: 27%, severe: 51.6%) Similar to our observations, CPAP emerged as the primary initial therapy (34.8%), followed by a substantial portion opting for lifestyle modifications or refusing treatment altogether (38.4%). This emphasizes the need for strategies to improve treatment acceptance²⁰. American Academy of Sleep Medicine recognizes lower oxygen saturation, mild to moderate daytime sleepiness, patients intolerant to CPAP, or declining surgery as indications for oral appliances provided the disease severity is mild to moderate.^{13,21} Our

study revealed that the severity of disease according to AHI was mild in 33.33% patients moderate in 43.94% patients and 22.73% patients had severe disease with AHI of more than 30. Oral Appliances provide noninvasive option in treatment of individuals diagnosed with sleep apnea only if the disease is not severe.¹¹ Our study had only four such patients. However, some patients did not receive any of these interventions. Analyzing the reasons behind lost-to-follow-up cases, treatment refusals, and reliance solely on lifestyle modifications can provide valuable insights for improving patient management. Exploring the effectiveness of lifestyle modifications for different severities and addressing adherence challenges are crucial aspects to consider. Overall, this study is a valuable snapshot of OSA characteristics and treatment patterns in our study setting. It underscores the importance of early diagnosis and intervention, alongside the need for further research on improving treatment adherence and addressing patient concerns that might lead to treatment refusal. Due to the retrospective nature of this study and the relatively small sample size of 66 patients, the findings may not be generalizable to the broader population with OSA. Future studies with larger and more diverse cohorts are warranted to confirm these observations and explore potential variations in treatment patterns across different patient groups.

Conclusion

The present study provides valuable insights into the demographic characteristics, severity, and treatment modalities of patients diagnosed with obstructive sleep apnea (OSA) at Lady Reading Hospital Peshawar. The findings indicate a higher prevalence of OSA among older adults, with a significant gender distribution favoring females in this cohort. The majority of patients experienced symptoms for more than three months, highlighting the chronic nature of the condition in this population.

The severity of OSA varied, with moderate severity being the most prevalent, followed by severe and mild cases. Treatment adherence appeared to be a major challenge, with a significant number of patients either not opting for or being lost to follow-up, especially those who were advised lifestyle modifications or CPAP/BiPAP interventions. Despite the availability of effective treatments such as CPAP and BiPAP, the reluctance to adhere to these therapies reflects the need for improved patient education, follow-up care, and strategies to overcome treatment barriers.

Overall, the study underscores the importance of early detection, appropriate treatment selection, and continuous patient monitoring to ensure better management of OSA. Addressing issues related to treatment adherence and patient follow-up could significantly enhance the long-term outcomes for patients with OSA. Further studies focusing on barriers to treatment adherence and

exploring alternative management strategies are recommended.

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