Original Article

Clinical Characteristics and Outcomes of Patients with Obstructive Sleep Apnea: A Prospective Observational Study

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Abstract

Background: Obstructive sleep apnea (OSA) is a common but underdiagnosed disorder characterized by recurrent upper airway obstruction during sleep, leading to significant cardiovascular, metabolic, and neurocognitive complications. This study aimed to evaluate the clinical profile, severity distribution, and outcomes of patients with OSA. **Material and Methods:** A prospective observational study was conducted on 100 patients diagnosed with OSA using overnight polysomnography. Demographic and clinical data, comorbidities, and Apnea–Hypopnea Index (AHI) values were recorded. Patients were stratified into mild, moderate, and severe OSA groups. Outcomes were assessed after six months, focusing on CPAP compliance, symptom improvement, and cardiovascular events. Statistical analysis was performed using SPSS version 26.0. **Results:** The mean age of patients was 48.6 ± 11.2 years, with a male predominance (68%). Most patients were aged 41–60 years. The majority were overweight or obese, and hypertension (46%) was the most frequent comorbidity, followed by diabetes (32%) and dyslipidemia (28%). Daytime sleepiness (82%) and loud snoring (76%) were the leading symptoms. The mean AHI was 28.7 ± 12.6 events/hour, with 40% having severe, 38% moderate, and 22% mild OSA. After six months, 62% of patients adhered to CPAP therapy, showing a significant reduction in Epworth Sleepiness Scale scores ($p < 0.001$). Self-reported sleep quality improved in 74% of compliant patients. New-onset hypertension and atrial fibrillation occurred in 5% and 3% of patients, respectively. **Conclusion:** OSA predominantly affects middle-aged, overweight men and is strongly associated with cardiometabolic comorbidities. CPAP therapy significantly improves symptoms and quality of life, although cardiovascular risks persist, underscoring the need for early diagnosis and sustained management.

Keywords: Obstructive sleep apnea, clinical characteristics, polysomnography, CPAP compliance, outcome.

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Introduction

Obstructive sleep apnea (OSA) is a common and often underdiagnosed sleep-related breathing disorder characterized by recurrent episodes of upper airway collapse during sleep, leading to intermittent hypoxemia, sleep fragmentation, and sympathetic overactivity.[1] The disorder is increasingly recognized as a global health concern, with estimates suggesting that nearly one billion individuals may be affected worldwide. Reported prevalence ranges from 9% to 38% in the adult population, with higher rates among men, older adults, and individuals with obesity.[2,3]

In the Indian context, the burden of OSA has been rising, largely due to increasing obesity, sedentary lifestyles, and greater availability of diagnostic facilities such as polysomnography in tertiary care centers.[4] The clinical presentation is variable but commonly includes excessive daytime sleepiness, loud snoring, witnessed apneas, and morning headaches. Importantly, OSA is strongly associated with a spectrum of cardiometabolic comorbidities, including systemic hypertension, type 2 diabetes, dyslipidemia, and coronary artery disease.[5]

Despite its high prevalence and well-established complications, OSA remains under-recognized in clinical practice. Timely diagnosis and appropriate intervention, particularly with continuous positive airway pressure (CPAP) therapy, are crucial to reducing adverse health outcomes. A thorough understanding of the clinical spectrum and patient outcomes across diverse populations is essential for optimizing detection, management, and long-term prognosis.

In India, research focusing on the clinical profile and longitudinal outcomes of OSA remains relatively limited. Against this background, the present study was undertaken to evaluate the demographic and clinical characteristics of patients with OSA, determine disease severity using polysomnography, and assess short-term outcomes, with particular emphasis on CPAP compliance and cardiovascular morbidity during a six-month follow-up.

Materials and Methods

Study Design and Setting: This was a prospective observational study conducted in the Department of ENT, KIMS & RF, Amalapuram, over a period of twelve months from May 2024 to

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Study Population: A total of 100 adult patients clinically suspected of obstructive sleep apnea (OSA) and referred for polysomnography were included. Diagnosis of OSA was confirmed using overnight level I polysomnography.

Inclusion Criteria

- Adults aged ≥18 years.
- Patients with newly diagnosed OSA (Apnea–Hypopnea Index ≥5).
- Patients willing to provide informed consent and comply with follow-up.

Exclusion Criteria

- Patients with central sleep apnea or mixed apnea.
- Patients with prior surgical or CPAP treatment for OSA.
- Severe systemic illnesses (renal, hepatic, or advanced cardiac disease).
- Pregnant women.

Data Collection: Detailed demographic data, clinical symptoms, and anthropometric measurements (BMI, neck circumference) were recorded. Comorbidities such as hypertension, diabetes mellitus, dyslipidemia, and coronary artery disease were noted. All patients underwent standardized overnight polysomnography to determine the Apnea–Hypopnea Index (AHI), minimum oxygen saturation, and severity grading of OSA (mild, moderate, severe).

Follow-up and Outcomes: Patients diagnosed with OSA were counseled for treatment and offered CPAP therapy where indicated. Outcomes were assessed over a 6-month follow-up period, focusing on:

CPAP compliance and symptom improvement (Epworth Sleepiness Scale).

Self-reported sleep quality.

Occurrence of cardiovascular events such as new-onset hypertension or arrhythmias.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using SPSS version 26.0. Descriptive statistics were presented as mean ± standard deviation for continuous variables and as frequencies and percentages for categorical variables. Group comparisons were performed using chi-square tests for categorical variables and Student's t-test for continuous variables. A p-value <0.05 was considered statistically significant.

Ethical Considerations: Approval for the study was obtained from the Institutional Ethics Committee of KIMS & RF, Amalapuram before commencement. Written informed consent was secured from all participants prior to enrollment. Patient confidentiality was strictly maintained, and all data were anonymized in accordance with ethical research standards.

Results

A total of 100 patients with confirmed obstructive sleep apnea were included in this study. The mean age of the cohort was 48.6 ± 11.2 years, with a male predominance (68%) [Table 1]. The majority of patients (54%) were within the 41–60 years' age group, while 18% were older than 60 years.

Table 1: Demographic Characteristics of Patients with OSA (N = 100)

Variable	Frequency (n)	Percentage (%)
Male	68	68.0
Female	32	32.0
Age 18–40 years	28	28.0
Age 41–60 years	54	54.0
Age > 60 years	18	18.0

Clinical Characteristics: Obesity was common, with a mean BMI of 29.4 ± 4.3 kg/m², and 64% of patients had a neck circumference greater than 38 cm. Excessive daytime sleepiness (82%), loud snoring (76%), and witnessed apneas (58%) were the most frequently reported symptoms. Hypertension was the predominant comorbidity (46%), followed by diabetes mellitus (32%), dyslipidemia (28%), and coronary artery disease (12%) [Table 2].

Table 2: Comorbidities among Patients with OSA (N = 100)

Comorbidity	Frequency (n)	Percentage (%)
Hypertension	46	46.0
Diabetes Mellitus	32	32.0
Dyslipidemia	28	28.0
Coronary Artery Disease	12	12.0
None	20	20.0

Severity of OSA: Based on polysomnographic assessment, the mean Apnea–Hypopnea Index (AHI) was 28.7 ± 12.6 events/hour. Severe OSA was present in 40% of patients, moderate OSA in 38%, and mild OSA in 22% [Table 3]. The distribution of severity is depicted in [Figure 1], which highlights the predominance of moderate-to-severe disease.

Table 3: Distribution of OSA Severity Based on AHI (N = 100)

OSA Severity (AHI)	Frequency (n)	Percentage (%)
Mild (5–15)	22	22.0
Moderate (15–30)	38	38.0
Severe (>30)	40	40.0

Table 4: Patient Outcomes after 6-Month Follow-up (N = 100)

Outcome	Frequency (n)	Percentage (%)
CPAP Compliant (Improved)	46	46.0
CPAP Non-Compliant (Improved)	14	14.0
New-Onset Hypertension	5	5.0
Atrial Fibrillation	3	3.0

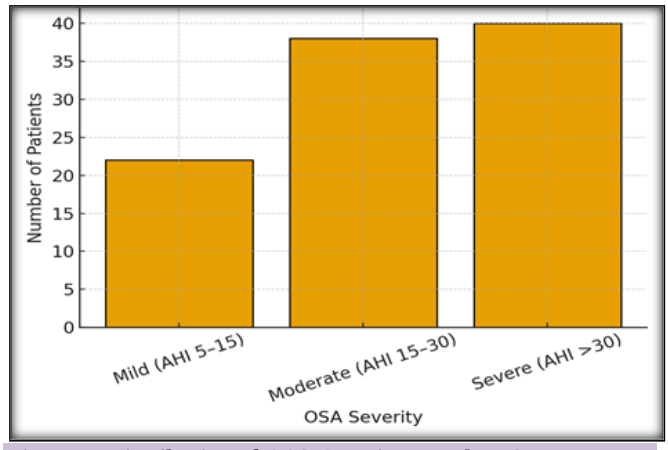

Figure 1: Distribution of OSA Severity Based on AHI

Outcomes after Six Months: At six months, 62 patients were compliant with CPAP therapy. Among these, a significant improvement in daytime sleepiness was observed, with a reduction in Epworth Sleepiness Scale scores from 14.2 ± 3.6 to 6.8 ± 2.4 ($p < 0.001$). Improved sleep quality was self-reported by 74% of CPAP-compliant patients compared with only 38% among non-compliant patients ($p < 0.01$). Despite therapy, 5% developed new-onset hypertension and 3% developed atrial fibrillation [Table 4].

Discussion

This prospective observational study highlights the clinical profile and outcomes of patients with obstructive sleep apnea (OSA) in a tertiary care setting. Consistent with prior evidence, OSA predominantly affected middle-aged, overweight men, with hypertension, diabetes, and dyslipidemia emerging as the most common comorbidities. The clustering of these risk factors underscores the systemic impact of OSA on cardiometabolic health.[6]

The mean age of our cohort (48.6 years) is in agreement with studies demonstrating peak prevalence between the fourth and sixth decades. The male predominance noted here also aligns with earlier reports, though women, particularly in the postmenopausal period, remain an underrecognized group at risk.[7]

Nearly half of our patients had systemic hypertension, supporting the bidirectional association between OSA and cardiovascular disease. OSA has been shown to adversely influence outcomes in patients undergoing percutaneous coronary interventions, with higher rates of restenosis and major adverse cardiovascular events.[6] Similarly, atrial fibrillation observed in our patients is consistent with the pathophysiological link between OSA-induced hypoxemia, autonomic imbalance, and arrhythmogenesis.[8]

Polysomnographic evaluation revealed that a majority (78%) had moderate-to-severe OSA, reflecting delayed diagnosis. This late presentation mirrors patterns observed in other Indian tertiary care studies. Patients with severe OSA demonstrated greater symptom burden and lower oxygen saturation, translating to increased risk of adverse outcomes.[9] Importantly, recent umbrella reviews have reinforced that OSA contributes to multiple systemic complications, including cardiovascular, cerebrovascular, and metabolic disorders.[9]

Continuous positive airway pressure (CPAP) therapy significantly improved symptoms in compliant patients, particularly in reducing daytime sleepiness and improving sleep quality, reaffirming its role as the gold standard. However, compliance in our cohort was limited to 62%, which is comparable to previously reported adherence rates. Non-compliance continues to be a major challenge due to discomfort, cost, and poor awareness.[10] Even among adherent patients, residual cardiovascular risks persist, highlighting the need for comprehensive management beyond CPAP.[8,11]

Our findings also echo broader evidence that OSA exacerbates outcomes in systemic diseases. For instance, OSA has been shown to worsen prognosis in acute coronary syndromes and stroke patients,[10] and it has emerged as a risk factor for poor outcomes in COVID-19 hospitalizations.[12] Such associations emphasize the importance of routine OSA screening in high-risk populations.

Strengths and Limitations: The strengths of this study include its prospective design and systematic follow-up using standardized polysomnography. However, the single-center nature, relatively short follow-up, and reliance on self-reported quality of life measures limit generalizability. Future multicentric studies with extended follow-up are required to better characterize long-term outcomes of OSA in Indian populations.

Strengths and Limitations: The strengths of this study include its prospective design, standardized diagnostic evaluation, and systematic follow-up. However, limitations include its single-center nature, relatively short follow-up period, and reliance on self-reported sleep quality measures. Larger multicentric studies with longer follow-up are warranted to assess long-term cardiovascular outcomes.

Conclusion

This prospective observational study highlights that obstructive sleep apnea is predominantly seen in middle-aged, overweight males and is strongly associated with cardiometabolic comorbidities, particularly hypertension and diabetes. The majority of patients presented with moderate-to-severe disease, underscoring the delayed diagnosis and under-recognition of OSA in clinical practice. CPAP therapy significantly improved daytime symptoms and sleep quality in compliant patients; however, adherence remained a major challenge. Cardiovascular risks persisted despite treatment, emphasizing the need for early identification, long-term monitoring, and comprehensive

management strategies. Strengthening awareness, promoting lifestyle modifications, and ensuring adherence to therapy are critical to mitigating the systemic burden of OSA.

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Conflicts of interest
There are no conflicts of interest.

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