BIOMEDICINE AND CHEMICAL SCIENCES
AN INTERNATIONAL PEER-REVIEWED JOURNAL

BIOMEDICINE AND CHEMICAL SCIENCES
Website: https://journals.irapa.org/index.php/BCS
e-ISSN: 2790-296X | p-ISSN:2957-5826

Original Article

Prevalence of Obstructive Sleep Apnea in Patients with Obesity and Type 2 Diabetes Mellitus

Dr. V. M. Kiran Ogirala[1], Dr. Kalyani Sri Koneru[2], Dr. Jhansi Lakshmi Elineni[3]

[1] Associate Professor, Department of Respiratory Medicine, Dr. Pinnamaneni Siddhartha Institute of Medical Sciences & Research Foundation, Gannavaram, Andhra Pradesh, India.

[2] Professor, Department of Respiratory Medicine, Dr. Pinnamaneni Siddhartha Institute of Medical Sciences & Research Foundation, Gannavaram, Andhra Pradesh, India.

[3] Assistant Professor, Department of Respiratory Medicine, Dr. Pinnamaneni Siddhartha Institute of Medical Sciences & Research Foundation, Gannavaram, Andhra Pradesh, India.

Corresponding Author:
Dr. V. M. Kiran Ogirala
Associate Professor, Department of Respiratory Medicine, Dr. Pinnamaneni Siddhartha Institute of Medical Sciences & Research Foundation, Gannavaram, Andhra Pradesh, India.

Article History:
Received on: Aug 06, 2026
Revised on: Aug 20, 2026
Accepted on: Sep 21, 2026
Published on: Sep 25, 2026

Citation: Dr. V. M. Kiran Ogirala *et al*. Prevalence of Obstructive Sleep Apnea in Patients with Obesity and Type 2 Diabetes Mellitus. *Biomedicine and Chemical Sciences, 5 (3): 241-244, 2026*

ABSTRACT

Introduction: Several studies have shown that OSA may independently contribute to insulin resistance, glucose intolerance, and ultimately the development of T2DM. Understanding the interplay between OSA, obesity, and T2DM is crucial for developing integrated prevention and management strategies.

Methodology: This cross-sectional observational study was conducted in the Department of Respiratory Medicine at Dr. Pinnamaneni Siddhartha Institute Of Medical Sciences & Research Foundation, Gannavaram, between Feburary 2024 and July 2025. A total of 35 obese patients (BMI ≥27.5 kg/m^2) with Type 2 Diabetes Mellitus were enrolled.

Results: A total of 35 patients (18 males and 17 females) were evaluated. The mean age was 49.9 years. All patients were obese and diabetic. Based on the Apnea-Hypopnea Index (AHI), 63% (22/35) of the patients were diagnosed with OSA. Of those, 7 had mild OSA, 5 moderate, and 10 severe.

Conclusion: Incidence of OSA was significantly higher in Type-2 Diabetes patients in comparison to general population. The high prevalence of OSA in Obese patients with Type- 2 Diabetes represents a serious public health problem and rises the probability that some of the morbidity and mortality associated with Type- 2 Diabetes may attributable to un-diagnosed OSA.

Keywords: Obstructive Sleep Apnea (OSA); Type 2 Diabetes Mellitus (T2DM); Obesity; Apnea-Hypopnea Index (AHI); Insulin Resistance.

INTRODUCTION

The prevalence of diabetes and obesity has reached epidemic proportions worldwide. In recent years, obstructive sleep apnea (OSA) has gained attention as a major cardiovascular and metabolic risk factor. OSA is characterized by recurrent episodes of partial or complete upper airway obstruction during sleep, resulting in intermittent hypoxia and sleep fragmentation.

OSA has a strong association with obesity; approximately 70% of OSA patients are obese. The relationship between OSA and Type 2 Diabetes Mellitus (T2DM) is also well-established, with overlapping risk factors such as obesity, visceral adiposity, and age contributing to their co-occurrence.

Several studies have shown that OSA may independently contribute to insulin resistance, glucose intolerance, and ultimately the development of T2DM. Understanding the interplay between OSA, obesity, and T2DM is crucial for developing integrated prevention and management strategies.

METHODOLOGY

This cross-sectional observational study was conducted in the Department of Respiratory Medicine at Dr. Pinnamaneni Siddhartha Institute Of Medical Sciences & Research Foundation, Gannavaram, between Feburary 2024 and July 2025. A total of 35 obese patients (BMI ≥27.5 kg/m²) with Type 2 Diabetes Mellitus were enrolled.

Inclusion Criteria:

- Age between 40 to 70 years
- BMI ≥27.5 kg/m²
- Diagnosed Type 2 Diabetes (self-reported or newly diagnosed per WHO criteria)

Exclusion Criteria:

- Age <40 or >70 years
- Critically ill, mentally unwell, or uncooperative patients
- Pregnant women
- Type 1 Diabetes or central sleep apnea patients

Each subject underwent overnight polysomnography (PSG) using NATUS Embletta MPR PG system. Anthropometric data including BMI, neck circumference, and waist circumference were measured. The Epworth Sleepiness Scale (ESS) was administered for subjective sleepiness assessment. Data was analyzed using statistical software with significance set at $p < 0.05$.

RESULTS

A total of 35 patients (18 males and 17 females) were evaluated. The mean age was 49.9 years. All patients were obese and diabetic. Based on the Apnea-Hypopnea Index (AHI), 63% (22/35) of the patients were diagnosed with OSA. Of those, 7 had mild OSA, 5 moderate, and 10 severe.

Table 1: Anthropometric Data

N	Age (years)	BMI (Kg/m²)	Neck Circumference (cm)	Waist Circumference (cm)
35	49.9 ± 6.47	36 ± 7.0	40.9 ± 5.82	104.09 ± 11.79

Table 2: Distribution of OSA Severity by Age Group

Age Group (Years)	Mild OSA	Moderate OSA	Severe OSA
40–49	5	3	3
50–59	2	1	5
60–69	0	1	2

Table 3: Distribution of OSA Severity by Gender

Gender	Mild OSA	Moderate OSA	Severe OSA
Male	4	3	6
Female	3	2	4

Table 4: Distribution of OSA Severity by Excessive Daytime Sleepiness (ESS)

EDS	Mild OSA	Moderate OSA	Severe OSA
Significant	6	5	7
Non-Significant	1	0	3

Table 4: Distribution of OSA severity by snoring

Snoring	Mild OSA	Moderate OSA	Severe OSA
Yes	4	5	9
No	3	0	1

Table 5: Distribution of OSA severity by smoking

Smoking	Mild OSA	Moderate OSA	Severe OSA
Yes	3	2	3
No	4	3	7

Table 6: Distribution of OSA severity by Hypertension

Hypertension	Mild OSA	Moderate OSA	Severe OSA
Yes	5	3	5
No	2	2	5

Table 7: Distribution of OSA severity by BMI

Obesity	Mild OSA	Moderate OSA	Severe OSA
Class 1	4	2	2
Class 2	0	2	2
Class 3	3	1	6

Table 8: Distribution of OSA severity by Neck circumference

Neck circumference	Mild OSA	Moderate OSA	Severe OSA
Significant	3	2	5
Non-significant	4	3	5

Table 9: Distribution of OSA severity by Diabetes control

Type-2 Diabetes	Mild OSA	Moderate OSA	Severe OSA
Controlled	2	0	0
Un-controlled	5	5	10

Among the OSA patients, the severity distribution was as follows: 31.8% (7) had mild OSA (AHI 5–15), 22.7% (5) had moderate OSA (AHI 15–30), and 45.5% (10) had severe OSA (AHI >30). The mean AHI was higher in males (21.0) compared to females (13.6).Males accounted for 59% of OSA cases. A statistically significant correlation was found between excessive daytime sleepiness (ESS > 10) and OSA severity ($p = 0.009$).There was also significant correlation between OSA and hypertension ($p = 0.0387$), BMI class ($p = 0.019$), and uncontrolled diabetes ($p = 0.0358$). Pearson's correlation coefficient between HbA1c and AHI was $R = 0.561$.

DISCUSSION

This study aimed to determine the prevalence of OSA in patients with type 2 diabetes.

A gender-based analysis revealed that males (59%) were more likely to have OSA, particularly of the severe type, consistent with prior findings from the Wisconsin Sleep Cohort [1]. This gender disparity has been attributed to differences in fat distribution, airway anatomy, and hormonal influences [2].

In terms of age distribution, OSA was most prevalent in the 40–49 age group, possibly due to early onset obesity-related complications in the South Asian population. This is slightly younger than the peak incidence seen in Western populations, where it tends to increase with age [2].

The strong correlation between high Epworth Sleepiness Scores (ESS) and OSA severity ($p=0.009$) confirms the utility of ESS in screening[3][4].

Obesity, particularly central obesity measured via waist circumference and neck circumference, was a consistent risk factor for OSA severity. The relationship is supported by literature linking fat distribution in the upper airway and visceral compartments with increased airway collapsibility and apneic episodes [5][6].The most notable finding is the high proportion (45.5%) of severe OSA among those affected. This distribution is in contrast to population-based studies like the Sleep Heart Health Study (SHHS) which reported only 18% of subjects with severe OSA [7]. The greater prevalence of severe OSA in our study may be attributed to hospital-based selection bias and higher BMI levels in the study group.

We observed a statistically significant association between OSA and uncontrolled diabetes (HbA1c >7), with a moderate correlation between HbA1c and AHI (R = 0.561). These findings align with studies that suggest OSA contributes to impaired glycemic control and increased insulin resistance [3][4].This study demonstrates a significant burden of Obstructive Sleep Apnea (OSA) in patients with obesity and Type 2 Diabetes Mellitus (T2DM), with a prevalence rate of 63%—substantially higher than the general population prevalence of 2%–4% [1].This study confirms the high prevalence (63%) of OSA among obese patients with Type 2 Diabetes Mellitus. The findings align with the Sleep AHEAD study(8), which reported an OSA prevalence of 86% in obese diabetics. The strong association of OSA with male gender, obesity severity (especially Class III), and uncontrolled diabetes was evident. These findings reinforce the need for routine screening of OSA in diabetic populations, particularly those with elevated BMI or HbA1c levels. The moderate correlation between HbA1c and AHI supports the hypothesis that OSA worsens glycemic control.

Hypertension also showed a significant association with OSA in our study (p = 0.0387), highlighting the cardiovascular implications of undiagnosed sleep-disordered breathing [8]

CONCLUSION

1. Incidence of OSA was significantly higher in Type-2 Diabetes patients in comparison to general population. The high prevalence of OSA in Obese patients with Type- 2 Diabetes represents a serious public health problem and rises the probability that some of the morbidity and mortality associated with Type- 2 Diabetes may attributable to un-diagnosed OSA.
2. Early detection and treatment of OSA in Obese Diabetic patients can prevent development of complications in them due to combined effects of both diseases.
3. Thus need for screening in Obese Type-2 Diabetes patients for undiagnosed OSA even in the absence of symptoms especially in individuals with higher BMI has been reinforced by this study.

REFERENCES

1. Bixler EO, et al. Am J Respir Crit Care Med. 1998; doi.org/10.1164/ajrccm.157.1.9706079
2. Young T, Shahar E, Nieto FJ, et al. Predictors of Sleep-Disordered Breathing in Community-Dwelling Adults: The Sleep Heart Health Study. Arch Intern Med. 2002;162(8):893–900. doi:10.1001/archinte.162.8.893
3. Peppard PE, Young T, Palta M, Dempsey J, Skatrud J. Longitudinal Study of Moderate Weight Change and Sleep-Disordered Breathing. JAMA. 2000;284(23):3015–3021. doi:10.1001/jama.284.23.3015
4. Punjabi, N. M., Newman, A. B., Young, T. B., Resnick, H. E., & Sanders, M. H. (2008). journal of respiratory and critical care medicine, 177(10), 1150–1155. https://doi.org/10.1164/rccm.200712-1884OC
5. Somers, V. K., White, D. P., Amin, R., Abraham, W. T., Costa, F., Culebras, A., Daniels, S., Floras, J. S., Hunt, C. E., Olson, L. J., Pickering, T. G., Russell, R., Woo, M., Young, T., (National Institutes of Health). Circulation, 118(10), 1080–1111. doi.org/10.1161/CIRCULATIONAHA.107.189375
6. Charles Dickens. The Pickwick Papers. 1837.
7. Foster GD, Borradaile KE, Sanders MH, et al. A Randomized Study on the Effect of Weight Loss on Obstructive Sleep Apnea Among Obese Patients With Type 2 Diabetes: The Sleep AHEAD Study. Arch Intern Med. 2009;169(17):1619–1626. doi:10.1001/archinternmed.2009.266
8. Foster, G. D., Sanders, M. H., Millman, R., Zammit, G., Borradaile, K. E., Newman, A. B., Wadden, T. A., Kelley, D., Wing, R. R., Sunyer, F. X., Darcey, V., Kuna, S. T., & Sleep AHEAD Research Group (2009). Obstructive sleep apnea among obese patients with type 2 diabetes. Diabetes care, 32(6), 1017–1019. https://doi.org/10.2337/dc08-1776