

Keywords

Chronic periodontitis, obstructive sleep apnea, polysomnography, clinical attachment loss, probing pocket depth, Mallampati Index, Epworth Sleepiness Scale, STOP-BANG Questionnaire

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Correlation Between Chronic Periodontitis And Obstructive Sleep Apnea – An Observational Study

Abstract

Aim: To evaluate the association between chronic periodontitis and obstructive sleep apnea (OSA) and to determine the correlation between periodontal parameters and OSA screening tools in adults with polysomnography-confirmed OSA.

Materials and Methods: This observational cross-sectional study included 20 adults with newly diagnosed OSA confirmed by overnight polysomnography at Sir Ganga Ram Hospital, New Delhi. OSA risk and severity were assessed using the STOP-BANG questionnaire, Epworth Sleepiness Scale (ESS), and Mallampati Index. Periodontal examination included probing pocket depth (PPD) and clinical attachment loss (CAL), and periodontal status was classified according to the 2017 World Workshop Classification of Periodontal Diseases. Spearman's rank correlation test was used to evaluate the association between periodontal parameters and OSA-related variables, with statistical significance set at $p < 0.05$.

Results: Clinical attachment loss and probing pocket depth showed significant positive correlations with the Mallampati Index ($\rho = 0.512$, $p = 0.021$) and Epworth Sleepiness Scale scores ($\rho = 0.510$, $p = 0.022$). Although positive correlations were observed with the STOP-BANG questionnaire and OSA type, these associations were not statistically significant ($p > 0.05$). The findings suggest that increasing OSA severity is associated with greater periodontal tissue destruction.

Conclusion: A significant association was observed between chronic periodontitis and obstructive sleep apnea. Higher Mallampati grades and ESS scores were associated with increased periodontal destruction, emphasizing the importance of interdisciplinary collaboration between periodontists and sleep medicine specialists for early diagnosis and comprehensive patient care.

Clinical Significance: Routine periodontal assessment in patients with obstructive sleep apnea and timely referral for sleep evaluation in patients with advanced periodontitis may facilitate early diagnosis and improve overall patient management.

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Figure 3 : GRADE 1 – MALLAMPATI INDEX



Figure 4: GRADE 2 – MALLAMPATI INDEX



Figure 5: GRADE 3 – MALLAMPATI INDEX



Figure 6: GRADE 4 – MALLAMPATI INDEX

Results

A total of 20 participants with polysomnography-confirmed obstructive sleep apnea (OSA) were included in the study. The study population comprised 16 males (80%) and 4 females (20%), indicating a clear male predominance. Regarding age distribution, 10 participants (50%) belonged to the 35–54 years age group, followed by 8 (40%) in the 55–75 years group, while only 2 participants (10%) were between 18 and 34 years of age (Table 1).

Spearman's rank correlation analysis was performed to evaluate the association between periodontal parameters and OSA-related variables, including the Mallampati Index, STOP-BANG Questionnaire, Epworth Sleepiness Scale (ESS), and type of OSA.

Both clinical attachment loss (CAL) and probing pocket depth (PPD) demonstrated a moderate positive correlation with the Mallampati Index ($\rho = 0.512$, $p = 0.021$) and ESS scores ($\rho = 0.510$, $p = 0.022$), indicating statistically significant associations. Participants with higher Mallampati grades and ESS scores exhibited greater periodontal tissue destruction.

Although CAL and PPD also showed moderate positive correlations with the STOP-BANG Questionnaire ($\rho = 0.419$, $p = 0.066$), these associations did not reach statistical significance. Similarly, a weak positive

correlation was observed between periodontal parameters and the type of OSA ($\rho = 0.299$, $p = 0.200$), which was also statistically non-significant.

Overall, the findings suggest that increasing upper airway crowding, as reflected by the Mallampati Index, and greater daytime sleepiness, as assessed by the ESS, are associated with increased periodontal destruction. In contrast, although positive trends were observed with the STOP-BANG Questionnaire and OSA type, these variables were not significantly associated with periodontal disease severity in the present study.

Summary of Findings

- ☐ OSA was more prevalent among males (80%) than females (20%).
- ☐ The majority of participants (50%) were 35–54 years of age.
- ☐ Mallampati Index demonstrated a significant moderate positive correlation with both CAL and PPD ($p = 0.021$).
- ☐ Epworth Sleepiness Scale also showed a significant positive correlation with CAL and PPD ($p = 0.022$).
- ☐ STOP-BANG Questionnaire demonstrated a moderate but statistically non-significant

- correlation with periodontal parameters ($p = 0.066$).
- Type of OSA showed only a weak, non-significant association with periodontal parameters ($p = 0.200$).
 - □ Overall, increasing OSA severity, particularly as reflected by higher Mallampati grades and ESS scores, was associated with greater periodontal tissue destruction.

Table 1. Demographic Characteristics of the Study Population (n = 20)

Variable	Category	n (%)
Gender	Male	16 (80.0)
	Female	4 (20.0)
Age (years)	18–34	2 (10.0)
	35–54	10 (50.0)
	55–75	8 (40.0)

Table 2. Correlation of Periodontal Parameters with OSA-related Variables

Variable	Clinical Attachment Loss (CAL) ρ (p-value)	Probing Pocket Depth (PPD) ρ (p-value)
Mallampati Index	0.512 (0.021*)	0.512 (0.021*)
STOP-BANG Questionnaire	0.419 (0.066)	0.419 (0.066)
Epworth Sleepiness Scale	0.510 (0.022*)	0.510 (0.022*)
Type of OSA	0.299 (0.200)	0.299 (0.200)

Spearman's rank correlation coefficient; $p < 0.05$ indicates statistical significance.

Summary of Findings:

- Significant Positive Correlations:
 - CAL/Pocket Depth and Mallampati Index ($p = 0.021$).
 - CAL/Pocket Depth and Epworth Sleepiness Scale ($p = 0.022$).
- Non-significant Relationships:
 - CAL/Pocket Depth and Stop-Bang Questionnaire ($p = 0.066$).
 - CAL/Pocket Depth and Type of OSA ($p = 0.200$).
- The data suggests a moderate relationship between the clinical measures (CAL and Pocket Depth) and Mallampati Index and Epworth Sleepiness Scale, which are statistically significant. This might indicate that as CAL or Pocket Depth increase, there is a tendency for a higher Mallampati score and increased sleepiness as measured by the Epworth Sleepiness Scale.
- However, the relationship with the Stop-Bang Questionnaire and Type of OSA is weaker and not statistically significant in this sample. The findings may suggest that CAL and Pocket Depth may not be strong indicators of OSA severity or risk based on these two specific measures.

Discussion

The present observational study evaluated the association between obstructive sleep apnea (OSA) and chronic periodontitis in patients with polysomnography (PSG)-confirmed OSA. The findings demonstrated a significant positive correlation between periodontal destruction, measured by clinical attachment loss (CAL) and probing pocket depth (PPD), and both the Mallampati Index and Epworth Sleepiness Scale (ESS). In contrast, the

associations with the STOP-BANG questionnaire and OSA type were positive but not statistically significant.⁹⁻¹⁰

The association observed in this study may be explained by shared inflammatory mechanisms. Repeated episodes of intermittent hypoxia in OSA increase oxidative stress and stimulate the release of pro-inflammatory cytokines, including interleukin-6 and tumor necrosis factor- α , which contribute to periodontal tissue destruction. In addition, mouth breathing and xerostomia commonly seen in OSA patients may create an oral environment favourable for periodontal disease progression.¹¹⁻¹²

The significant correlation between the Mallampati Index and periodontal parameters suggests that greater upper airway crowding may be associated with increased periodontal destruction.¹³ Similarly, higher ESS scores, reflecting excessive daytime sleepiness and poor sleep quality, were associated with greater CAL and PPD. These findings indicate that worsening OSA-related clinical features may be accompanied by increased periodontal tissue breakdown.¹⁴⁻¹⁵

Although the STOP-BANG questionnaire showed a moderate positive correlation with CAL and PPD, the association was not statistically significant. This may be related to the small sample size and the fact that STOP-BANG is primarily a screening tool rather than a measure of disease severity.¹⁶

The present findings are consistent with recent studies. Portelli et al. (2024) reported a significant association between OSA and periodontitis in their systematic review and meta-analysis, while Chen et al. (2023) demonstrated greater clinical attachment loss and probing depth in patients with PSG-confirmed OSA. Similarly, Mukherjee and Galgali (2023) observed a positive correlation between OSA risk and periodontal destruction using the STOP-BANG questionnaire. These studies support the

concept that OSA and periodontitis share common inflammatory pathways and risk factors.¹⁷⁻¹⁸

A major strength of the present study is the use of overnight polysomnography, the gold standard for diagnosing OSA, along with standardized periodontal examination. However, the relatively small sample size and cross-sectional design limit the ability to establish a causal relationship.¹⁹ Larger longitudinal studies are required to confirm these findings and to determine whether periodontal therapy can influence OSA severity. Overall, the present study supports a significant association between chronic periodontitis and obstructive sleep apnea.²⁰ These findings emphasize the importance of interdisciplinary collaboration between periodontists and sleep medicine specialists for early diagnosis and comprehensive patient management.

Conclusion

Within the limitations of this observational study, a significant association was observed between chronic periodontitis and obstructive sleep apnea (OSA). Clinical attachment loss and probing pocket depth demonstrated significant positive correlations with the Mallampati Index and Epworth Sleepiness Scale, suggesting that increasing OSA severity may be associated with greater periodontal tissue destruction. Although positive correlations were observed with the STOP-BANG questionnaire and OSA type, these associations were not statistically significant.

The findings highlight the importance of considering periodontal evaluation in patients with OSA and support an interdisciplinary approach involving periodontists and sleep medicine specialists for early diagnosis and comprehensive patient management. Further longitudinal studies with larger sample sizes are recommended to confirm these findings and to better understand the causal relationship between OSA and periodontitis.

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