Review Article

Obesity as a Risk Factor for Chronic Periodontitis: A Comprehensive Review

Harish Kumar VV[1], Saumiya Gopal[2], Shruthi Nambiar[3], Joel George James[4]

[1]Professsor and Head, Department of Periodontology, KMCT Dental College, Calicut, Kerala
[2]Professsor, Department of Periodontology, KMCT Dental College, Calicut, Kerala
[3]Reader, Department of Periodontology, KMCT Dental College, Calicut, Kerala
[4]Post Graduate Student, Department of Periodontology, KMCT Dental College, Calicut, Kerala
Corresponding Author: Dr Joel George James; Post Graduate Student, KMCT Dental College, Calicut, Kerala

Abstract The existing body of evidence supports a significant association between obesity and chronic periodontitis, highlighting obesity as a potential risk modifier for periodontal disease. Shared inflammatory and metabolic pathways, including increased systemic inflammation, dysregulated immune responses, and insulin resistance, appear to play a central role in linking these two chronic conditions. Obese individuals tend to exhibit greater prevalence and severity of periodontal destruction, underscoring the importance of considering body weight and metabolic status in periodontal risk assessment and management. Despite growing evidence, heterogeneity among studies and the influence of confounding factors limit definitive conclusions regarding causality. Therefore, further longitudinal and interventional research is required to elucidate the underlying mechanisms and to determine whether weight reduction and metabolic control can positively influence periodontal health outcomes. An integrated, multidisciplinary approach involving dental and medical professionals may enhance prevention and treatment strategies, ultimately improving both oral and systemic health.

Keywords: Body Mass Index; Chronic periodontitis; Inflammation; Periodontal disease; Risk factors

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INTRODUCTION

Periodontal disease is a chronic inflammatory condition affecting the gingiva and supporting structures of the teeth, including the periodontal ligament, cementum, and alveolar bone. It is characterized by periodontal pocket formation, clinical attachment loss, and progressive bone destruction that may ultimately lead to tooth loss.[1] Epidemiological data indicate that periodontal disease is highly prevalent worldwide and represents a major public health burden.[2] Several risk factors have been identified for periodontal disease, including smoking, diabetes mellitus, advancing age, poor oral hygiene, genetic predisposition, and socioeconomic status.[3]

Obesity is defined as excessive fat accumulation that impairs health and is commonly diagnosed at a body mass index (BMI) ≥30 kg/m² Obesity has also been recognized as a chronic relapsing disease process requiring long-term clinical management.[4] It is a major contributor to non-communicable diseases and is associated with increased morbidity and mortality.[5] Both obesity and chronic periodontitis are characterized by persistent low-grade inflammation. Adipose tissue functions as an active endocrine organ that releases pro-inflammatory cytokines such as tumor necrosis factor-α and interleukin-6, which may amplify inflammatory responses within periodontal tissues.[6]

This biological overlap provides a plausible mechanistic link between obesity and periodontal destruction. Systematic reviews and epidemiological studies have increasingly reported a positive association between overweight or obesity and periodontal disease.[7-9] Prospective cohort studies have further demonstrated that greater adiposity predicts future periodontal disease incidence and progression.[10-12] However, many earlier investigations were cross-sectional and limited by small sample sizes. To address these limitations, Chen et al. conducted a nationwide population-based retrospective cohort study using Taiwan's National Health Insurance Research Database to investigate whether obesity increases the risk of developing chronic periodontitis.[13]

Methodological Considerations

The study analysed data from the Longitudinal Health Insurance Database derived from the National Health Insurance Research Database, which covers more than 99% of Taiwan's population. Patients with obesity were identified using ICD-9-CM code 278, and chronic periodontitis was identified using ICD-9-CM code 523.4. To enhance diagnostic accuracy, only individuals with at least two recorded diagnoses were included. Propensity score matching was applied to minimize confounding by age, sex, monthly income, urbanization, and comorbidities such as hypertension, hyperlipidaemia, diabetes, chronic obstructive pulmonary disease, anxiety, depression, and insomnia.[13] Cox proportional hazards models were used to estimate hazard ratios for chronic periodontitis.

Association Between Obesity and Chronic Periodontitis

During the 13-year follow-up period, obese individuals exhibited a 12% higher risk of developing chronic periodontitis compared with non-obese controls (HR = 1.12; 95% CI: 1.01–1.25) found by Chen TP et al 2021.[13] These findings are consistent with earlier longitudinal studies showing that overweight and obese individuals experience faster periodontal disease progression.[11,12]

Age- and Sex-Specific Findings

Subgroup analyses by Chen TP 2021 demonstrated that individuals aged ≥65 years with obesity had nearly double the risk of chronic periodontitis compared with non-obese elderly individuals (HR = 1.98; 95% CI: 1.22–3.22).[13] No significant associations were found in younger age groups. No statistically significant differences were observed between men and women, which is consistent with previous population-base investigations reporting similar risk patterns across sexes.[14]

Potential Biological Mechanisms

Pro-inflammatory cytokines derived from adipose tissue may stimulate osteoclastogenesis and connective tissue breakdown, thereby accelerating alveolar bone loss.[6] Obesity is also associated with insulin resistance, which may impair immune function and increase susceptibility to periodontal infection.[15] Visceral adiposity has been proposed to play a more critical role than total body fat in mediating periodontal destruction.[9]

Clinical and Public Health Implications

The evidence suggests that obesity should be considered a potential risk indicator for chronic periodontitis. Dental professionals may incorporate weight status into periodontal risk assessment and emphasize lifestyle counselling. Likewise, physicians managing obese patients should encourage regular dental visits. Integrated prevention strategies may yield benefits for both metabolic and periodontal health. The bidirectional relationship between obesity and periodontitis is complex and multifaceted. Adipose tissue functions as an endocrine organ, releasing cytokines, and proinflammatory hormones that contribute to systemic inflammation and oxidative stress common pathophysiological mechanisms shared by both conditions.[16]

Periodontal microbiota and obesity

Obesity plays a role in the dysbiosis of the subgingival microbiome due to various factors, such as systemic inflammation and changes in immune response. The excess fatty tissue found in individuals with obesity generates inflammatory mediators and reactive oxygen species (ROS), which impact systemic metabolism and periodontal health. Numerous studies have indicated a rise in the levels of Tannerella forsythia in subgingival plaque and Porphyromonas gingivalis in the saliva of obese patients when compared to those who are not obese.[17] On the other hand, periodontal inflammation may also lead to systemic inflammation, worsening obesity and its associated metabolic issues, including insulin resistance and chronic inflammation, which are prevalent in obesity. Additionally, periodontal inflammation can lead to intestinal dysbiosis, forming a harmful cycle that continues to undermine both oral and systemic

health. This reciprocal relationship highlights the necessity of tackling oral health and obesity together to enhance clinical results.[18]

CONCLUSION

Obesity is a complex and multifactorial disease and its relationship with periodontal disease and other chronic diseases is well documented but the underlying mechanism is under investigation. The evidence suggests that obesity significantly increases the risk of developing and exacerbating periodontitis, with elevated inflammatory biomarkers in patients with obesity. Study heterogeneity and uncontrolled confounding factors limit the generalizability of findings. Further research is needed to understand the underlying mechanisms and develop more effective therapeutic strategies for periodontitis and obesity. Collaboration between periodontal health professionals and obesity experts is essential to moving toward integrated and personalized approaches to managing these interrelated conditions.

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