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OBESITY AND PERIODONTAL DISEASE: CURRENT EVIDENCE AND CLINICAL IMPLICATIONS - A NARRATIVE REVIEW

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ABSTRACT

Objectives: This narrative review aimed to summarize current evidence on the association between obesity and periodontal disease, with particular emphasis on periodontal status and disease severity, factors influencing this relationship, periodontal treatment outcomes, and the potential effects of weight reduction on periodontal health.

Methods: A narrative literature review was conducted using full-text publications identified through PubMed, Scopus, and Google Scholar. Studies published between 2011 and 2026 were considered. The search included terms related to obesity, overweight, periodontitis, periodontal disease, body mass index, waist circumference, adiposity, periodontal inflammation, periodontal treatment, nonsurgical periodontal therapy, weight loss, physical activity, and bariatric surgery. Original studies, systematic reviews, meta-analyses, and relevant review articles were included.

Key Findings: Current evidence generally indicates that periodontitis is more common among individuals with obesity, although results for individual clinical periodontal parameters are not fully consistent. Factors such as diabetes, smoking, oral hygiene, diet, physical activity, and socioeconomic status may influence this association. Available evidence does not consistently show poorer outcomes of nonsurgical periodontal therapy in patients with obesity. Some studies suggest that weight reduction may have beneficial effects on periodontal health, but the available evidence is still limited, and results after bariatric surgery are inconsistent.

Conclusions: Obesity should be considered alongside other factors when assessing periodontal risk, rather than as a stand-alone indicator of periodontal disease. Standard periodontal treatment remains effective in patients with obesity. Further prospective and long-term studies are needed to better clarify the relationship between obesity, weight reduction, and periodontal health.

KEYWORDS

Obesity, Periodontitis, Periodontal Disease, Periodontal Treatment, Weight Loss

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1. Introduction

Obesity is one of the major contemporary public health challenges. An analysis including data from 200 countries and territories showed a substantial increase in the prevalence of obesity among adults, children, and adolescents between 1990 and 2022 [1]. Obesity is currently regarded as a complex, multifactorial chronic condition associated with excessive accumulation of adipose tissue, which may affect the functioning of multiple body systems and increase the risk of other chronic diseases [2].

Periodontitis is also an important public health problem. It is a chronic, complex inflammatory disease of the periodontal tissues [3]. According to Global Burden of Disease 2021 data, severe periodontitis affected more than one billion people worldwide, with an age-standardized prevalence of approximately 12.5% [4]. The high prevalence of both conditions makes their potential interrelationship relevant from both clinical and public health perspectives.

Numerous studies have investigated the association between obesity and periodontal disease [5]. The occurrence and course of both conditions may be influenced by metabolic, behavioral, and environmental factors. Chronic inflammation is one of the possible links between obesity and periodontitis. Obesity is associated with persistent low-grade inflammation [6], whereas the inflammatory response plays a key role in the development and progression of periodontitis [7]. However, the relationship between these conditions is complex and may also depend on other factors affecting periodontal health.

The growing number of publications on obesity and periodontal health highlights the need to summarize the current evidence and assess its relevance to dental practice. The aim of this narrative review is to summarize current evidence on the association between obesity and periodontal disease, with particular consideration of periodontal status and periodontitis severity, treatment outcomes, factors influencing the observed relationship, the effects of weight loss, and the clinical relevance of these findings in dental practice.

2. Methodology

This narrative review was based on full-text scientific publications identified through PubMed, Scopus, and Google Scholar. The search included terms such as *obesity*, *overweight*, *periodontitis*, *periodontal disease*, *periodontal health*, *body mass index*, *BMI*, *waist circumference*, *adiposity*, *periodontal inflammation*, *periodontal treatment*, *nonsurgical periodontal therapy*, *weight loss*, *dietary intervention*, *physical activity*, and *bariatric surgery*. The terms were combined using the Boolean operators AND and OR.

Publications from 2011 to 2026 were considered. Articles were selected based on their titles and abstracts and subsequently assessed in full text. Original studies, systematic reviews, meta-analyses, and other relevant review articles were included if they addressed the association between obesity or excess body weight and periodontal disease, periodontal status or disease severity, factors influencing this relationship, periodontal treatment outcomes, or the potential effects of weight reduction on periodontal health.

The selected studies were grouped according to the main themes identified in the literature, including the association between obesity and periodontal disease, periodontal status and disease severity, factors influencing the obesity-periodontitis association, periodontal treatment outcomes, and the effects of weight loss and obesity treatment on periodontal health.

3. Results

3.1. Association Between Obesity and Periodontal Disease

The studies analyzed in this review indicate an association between obesity and the occurrence of periodontitis. In the most recent systematic review and meta-analysis, which included 19 studies and a total of 41,107 participants, obesity ($\text{BMI} \geq 30 \text{ kg/m}^2$) was associated with a higher likelihood of periodontitis compared with the absence of obesity [8]. Similar conclusions were reached by Arbildo-Vega et al. in an umbrella review including 14 systematic reviews. All of the included reviews reported an association between obesity and periodontal disease, although the magnitude of the effect varied across analyses [9].

In their systematic review, Kim et al. included 37 full-text publications, 29 of which provided data for the meta-analysis assessing the association between obesity and periodontitis. The pooled results also indicated a higher likelihood of periodontitis among individuals with obesity. In subgroup analyses, OR values varied according to age and were 2.21 for individuals aged 18-34 years, 1.53 for those aged 35-54 years, and 1.82 for those aged ≥ 55 years [10]. An earlier systematic review by Suvan et al. also showed differences according to

body weight category. Overweight was associated with a higher likelihood of periodontitis, while the association was more pronounced in individuals with obesity [11].

The association between obesity and periodontitis was also observed using measures other than BMI. Liu et al., analyzing data from 6,662 adult participants in NHANES 2011-2014, found that a larger waist circumference was associated with a higher likelihood of periodontitis even after adjustment for potential confounding factors [12]. In the same study, BMI ≥ 30 kg/m² among individuals aged 30-44 years was also associated with a higher likelihood of periodontitis [12].

Prospective studies also indicate an association between excess body weight and periodontal disease. Jimenez et al. followed 36,910 men without self-reported periodontal disease at baseline for up to 20 years. Obesity was associated with a higher risk of subsequently reporting a diagnosis of periodontal disease [13]. An increased risk was also observed in individuals with a large waist circumference and a high waist-to-hip ratio (WHR) [13]. Similarly, Gorman et al., in a longitudinal study of 1,038 men, found that obesity was associated with a higher risk of periodontal disease progression assessed on the basis of probing depth, clinical attachment loss, and alveolar bone loss [14].

3.2. Obesity, Periodontal Status and Disease Severity

In addition to the higher prevalence of periodontitis among individuals with obesity, studies have also examined the relationship between excess body weight and specific clinical periodontal parameters. In their systematic review, Abu-Shawish et al. assessed, among other outcomes, probing pocket depth (PPD), clinical attachment level (CAL), bleeding on probing (BOP), and tooth loss [15]. Most of the included studies reported an association between obesity and periodontitis, although findings for individual clinical parameters were not entirely consistent [15]. In a cross-sectional study of 1,000 adults, Vishwanath et al. found that higher BMI was significantly associated with greater PPD and CAL, while a larger waist circumference was also associated with higher values of these parameters [16].

More recent studies also suggest that obesity may be associated with more advanced forms of periodontitis. In the 2026 HUNT4 Oral Health Study, severe stage III-IV periodontitis was more common among individuals with obesity than among those with normal body weight, even after adjustment for potential confounding factors [17]. In addition, severe periodontitis was more common among individuals with overweight or obesity and low physical activity than among those with normal body weight and higher levels of physical activity [17].

Findings regarding the severity of gingival inflammation are less consistent. Da Silva et al. analyzed 90 studies evaluating clinical measures of gingival inflammation in individuals with obesity [18]. Many individual studies found no significant differences between groups; however, pooled analysis of patients with periodontitis showed greater gingival inflammation among individuals with obesity [18].

Differences between findings are also apparent in studies assessing several clinical parameters simultaneously. In a study of 45 patients with periodontitis, no significant differences were found between individuals with obesity and those with normal body weight in mean CAL, PPD, BOP, or plaque index [19]. At the same time, periodontal inflamed surface area (PISA) was significantly greater in the obesity group [19]. Tooth loss was also assessed in the review by Abu-Shawish et al., although the available data for this outcome were limited [15].

3.3. Factors Influencing the Obesity-Periodontitis Association

The association between obesity and periodontitis may be influenced by a range of metabolic, behavioral, and socioeconomic factors. In their analysis of NHANES 2011-2014 data, Liu et al. considered age, sex, education, income, smoking, alcohol consumption, physical activity, oral hygiene-related behaviors, dental visits, diabetes, and dietary factors, among others [12]. After adjustment for these variables, a larger waist circumference remained associated with a higher likelihood of periodontitis [12]. In the study by Shungin et al., the observed association between BMI and periodontitis was partially attenuated after adjustment for age, sex, smoking, education, oral hygiene-related behaviors, and dental visits; the OR decreased from 1.13 in the unadjusted analysis to 1.08 after adjustment [20].

Diabetes is an important coexisting factor. In a meta-analysis of cohort studies by Stöhr et al., including seven studies, 295,804 participants, and more than 22,500 cases of periodontitis, diabetes was associated with a higher risk of developing periodontal disease [21]. Smoking is also an important factor. A systematic review including 15 studies found a higher risk of periodontitis among smokers [22].

Oral health-related behaviors are also associated with periodontal status. Lertpimonchai et al. found that poor oral hygiene was associated with approximately fivefold higher odds of periodontitis compared with good oral hygiene, whereas regular toothbrushing and regular dental visits were associated with lower odds of the disease [23]. Diet may also play a role. In a systematic review on free sugar intake, 11 of 13 included studies reported a significant association between frequent consumption of foods or beverages containing free sugars and a higher prevalence or incidence of periodontal disease [24].

The relationship between obesity and periodontal status may also vary according to socioeconomic circumstances. In a study conducted in Tokyo, an interaction between obesity and income level was observed [25]. The association between obesity and a higher percentage of teeth with PPD ≥ 4 mm was more pronounced in the low- and middle-income groups than in the high-income group [25].

3.4. Obesity and Periodontal Treatment Outcomes

The relationship between obesity and periodontal treatment outcomes has been studied primarily in the context of nonsurgical periodontal therapy (NSPT). In the most recent meta-analysis, Dowlatshahi et al. included cohort studies comparing treatment outcomes in patients with periodontitis with and without obesity [26]. In both groups, NSPT resulted in significant reductions in probing pocket depth (PPD) and improvements in clinical attachment level (CAL), while the differences between groups were not statistically significant [26]. Similar findings were reported by Paranhos et al. Both groups improved after treatment, and BMI had no significant effect on changes in PPD or CAL [27].

Earlier studies produced less consistent results. In a systematic review including eight studies, Gerber et al. found that three showed no effect of obesity on PPD reduction after NSPT, whereas five indicated a less favorable treatment response in individuals with obesity [28]. Because of substantial heterogeneity among the studies, the authors did not perform a meta-analysis [28]. In a study of 260 patients with severe periodontitis, higher BMI and obesity were associated with greater mean PPD and a higher percentage of sites with PPD > 4 mm two months after treatment [29]. No significant association was found between BMI and CAL or full-mouth gingival bleeding score [29].

Similar relationships were also assessed in smaller clinical studies. Bouaziz et al. compared 18 individuals with obesity with 18 individuals of normal weight. After six months, PPD reduction was 0.79 and 0.88 mm, respectively, while CAL improvement was 0.68 and 0.84 mm [30]. In multivariable analysis, obesity was associated with less improvement, particularly in pockets with PPD > 5 mm [30].

Findings from prospective studies and longer follow-up periods also do not consistently indicate a poorer treatment response in individuals with obesity. In a nine-month prospective study including 55 patients with obesity and 39 without obesity, PPD, CAL, gingival index, and plaque index improved significantly after NSPT in both groups, with no significant differences between them [31]. Similarly, in a two-year follow-up of 22 patients, no significant differences were found between individuals with obesity and those of normal weight in PPD, CAL, BOP, or visible plaque after previous periodontal treatment [32].

3.5. Weight Loss and Periodontal Health

The effects of weight reduction on periodontal health have been evaluated in studies involving dietary changes, lifestyle modification, and bariatric surgery. Martinez-Herrera et al. assessed 78 patients with obesity and periodontitis who underwent nonsurgical periodontal therapy. After 12 weeks, periodontal parameters improved in both groups; however, patients who also followed a weight-reduction diet showed a greater reduction in mean PPD than those who did not receive dietary therapy. A greater reduction in the percentage of sites with PPD of 4-5 mm was also observed [33]. In a 12-week study of 71 men with BMI > 25 kg/m², Omori et al. found that in the group undertaking regular exercise, the percentage of teeth with PPD ≥ 4 mm decreased from 14.4% to 5.6%, while BOP decreased from 39.8% to 14.4%. No significant improvement in these parameters was observed in the group following a weight-reduction diet alone [34].

Findings regarding bariatric surgery are less consistent. In a meta-analysis of four prospective studies, Čolak et al. found worsening of BOP, CAL, and PPD six months after surgery, whereas no significant changes from baseline were observed after 12 months [35]. A 2025 review also reported mixed findings after bariatric surgery; improvement in PPD was reported in only 2 of 10 studies, CAL in 1 of 9, and BOP in 3 of 10 [36].

4. Discussion

4.1. Interpretation of the Current Evidence

Available evidence indicates an association between obesity and periodontitis. Systematic reviews and meta-analyses show a higher likelihood of periodontitis among individuals with obesity [8-11], while prospective data also indicate an association between excess body weight and the subsequent occurrence or progression of the disease [13,14]. However, this relationship is not equally apparent across all clinical parameters. Although some studies report greater PPD and CAL in individuals with obesity [15,16], as well as a higher prevalence of severe periodontitis [17], findings regarding BOP, plaque index, tooth loss, and other indicators of inflammatory severity are more variable [15,18,19]. Results concerning periodontal treatment response are similarly inconsistent. Some earlier studies suggested a less favorable response in individuals with obesity [28-30], whereas the most recent meta-analyses found no significant differences in PPD and CAL improvement between patients with and without obesity [26,27].

The observed association does not mean that obesity directly causes periodontitis. The relationship between these conditions may also be influenced by other factors, including diabetes, smoking, oral hygiene, diet, physical activity, and socioeconomic circumstances [12,17,20-25]. In the study by Shungin et al., the strength of the association between BMI and periodontitis decreased after adjustment for some of these factors [20]. A more recent analysis using genetic data also found no convincing evidence of a direct causal effect of obesity-related traits on periodontitis, despite the presence of partially shared genetic background [37].

Interpretation of the findings is also complicated by the widespread use of BMI as the primary measure of obesity. BMI does not distinguish between adipose tissue and lean body mass and does not provide information on fat distribution [38]. Therefore, additional measures such as waist circumference or waist-to-hip ratio (WHR) may provide more detailed information [12,13]. One possible explanation for the observed association is the chronic low-grade inflammation associated with obesity, which may affect the inflammatory response in periodontal tissues [39]. This may partly explain the observed relationship, but it does not provide evidence that obesity directly leads to the development of periodontitis.

4.2. Clinical Implications for Dental Practice

The association between obesity and periodontitis is also relevant to dental practice. Given the higher prevalence of periodontal disease and the possibility of greater disease severity among individuals with obesity [8-17], particular attention should be paid to periodontal status in this group of patients. Assessment should include, among other parameters, probing depth, bleeding on probing, and clinical attachment level, while patients diagnosed with periodontitis should receive appropriate treatment and regular supportive periodontal care. Obesity should be considered as one component of a broader risk assessment rather than as an independent indicator of the presence or severity of periodontitis.

Other factors affecting periodontal health should also be taken into account. Diabetes, smoking, inadequate oral hygiene, diet, and socioeconomic factors may influence periodontal status and the observed association [21-25]. The dental history should therefore include these factors, and referral to an appropriate specialist may be considered when indicated. Particular attention may be warranted in patients at risk of impaired glucose metabolism. Studies conducted in dental settings suggest that screening for dysglycemia may help identify patients who require further medical evaluation [40].

Obesity should not be regarded as a reason to limit standard periodontal treatment. The most recent meta-analysis showed improvements in PPD and CAL after NSPT in patients both with and without obesity, with no significant differences between groups [26]. Standard periodontal treatment therefore remains effective in patients with obesity. Cheong and Suvan also highlight the potential for collaboration between dental teams, physicians, and dietitians in the care of patients with both obesity and periodontitis [41].

The role of the dental team includes prevention, oral hygiene education, regular periodontal monitoring, and support for health-promoting behaviors. When discussion of body weight is relevant to a patient's health, it should be approached in a neutral and non-stigmatizing manner. Studies among members of dental teams have identified stigmatizing attitudes toward individuals with obesity, as well as insufficient training in obesity-related issues among some staff members [42]. Individualized patient assessment and avoidance of stereotypes are therefore important aspects of dental care.

4.3. Limitations of Current Evidence and Future Directions

Interpretation of the current evidence on the association between obesity and periodontitis is limited primarily by the nature of the available studies. A substantial proportion of the literature is based on cross-sectional and observational studies, which can demonstrate the coexistence of the two conditions but cannot clearly determine the direction of the relationship or confirm causality [8,10,15]. Prospective studies are also available [13,14], but they are less numerous.

Comparison of findings is further complicated by differences in how obesity and periodontitis are defined. In many studies, obesity has been assessed mainly using BMI, whereas periodontitis has been diagnosed using various criteria based on measures such as PPD, CAL, or epidemiological indices. The introduction of the 2017 classification provided a more standardized diagnostic framework for periodontitis [43].

Differences in the consideration of factors such as diabetes, smoking, oral hygiene, diet, and socioeconomic status may also affect study findings [20-25], as may differences between the populations examined. Evidence on the long-term effects of weight reduction on periodontal health remains limited [33-36].

Future studies should include larger, well-controlled prospective cohorts, use standardized diagnostic criteria and more accurate measures of adiposity, and assess the long-term effects of weight reduction and obesity treatment on periodontal health.

5. Conclusions

Available evidence indicates that obesity is associated with a higher likelihood of periodontitis and, in some studies, with more advanced forms of the disease. However, this relationship is not consistent across all clinical parameters, and findings for PPD, CAL, BOP, and tooth loss remain somewhat variable. There is also no conclusive evidence that obesity reduces the effectiveness of standard nonsurgical periodontal therapy.

The observed association may be influenced by several factors, including diabetes, smoking, oral hygiene, diet, physical activity, and socioeconomic conditions. Obesity should therefore be considered as one component of risk assessment rather than as an independent indicator of the presence or course of periodontal disease.

In clinical practice, careful assessment of periodontal status, prevention, and regular supportive care are particularly important in patients with obesity. Standard periodontal treatment remains effective in this group of patients. Further prospective and long-term studies are needed to better clarify the direction of the observed association and the relevance of weight reduction to periodontal health.

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Data collection and/or compilation - Martyna Smogór, Monika Szerszeń

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