

Association between Periodontitis and Obesity/Overweight

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Abstract

Periodontitis is a chronic infectious disease of bacterial origin that affects the supporting tissue of the teeth. Inflammation is the primary pathogenesis mechanism of this disease and the linking mechanism of association that elicits a close relationship between obesity and periodontitis. Obesity, because of the associated systemic inflammation, has been identified as a risk factor for the development of periodontitis. Obesity has been associated with high plaque index, gingival index, and bleeding on probing scores, all of which favor the development and propagation of periodontitis. However, data regarding this association is inconclusive with some of school of thought proposing no association between obesity and periodontitis given the observation of better oral hygiene and periodontal health with fewer comprised teeth among obese adolescents as compared to their normal-weight patients. This alternative school of thought proposes the coexistence of risk factors for both diseases such dietary and socioeconomic factors as the explanation of the reason why these diseases tend to demonstrate high prevalence rates in similar regions with obese populations. The presence of this controversy provides fertile ground for research in this topic to help arrive at consensus decisions about the ultimate association between obesity and periodontitis and the mechanism of the association.

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Association between Periodontitis and Obesity/Overweight

Introduction

Periodontitis is a chronic infectious disease affecting the supporting tissues of the teeth. It is predominantly of bacterial origin and the pathogenesis of this disease follows from the release of endotoxins by the infecting bacteria which subsequently activate pro-inflammatory cytokines. The pro-inflammatory cytokines thus released initiate inflammatory reactions around the infested teeth which significantly affect the supporting tissues of the teeth leading to pretty serious consequences if left untreated such as the loss of cementum, alveolar bone, and in the more severe cases, the loss the periodontal ligament (Ana et al., 2016, p. 2-5). The disease has been determined to be affected or influenced by genetics and lifestyles condition such as obesity.

Obesity is currently a recognized chronic disease with multifactorial causes in etiology that assumes pathogenesis from the interplay between lifestyle and genetics (Santos et al., 2019, p. 173). It is the single most common cause of major adverse health outcomes, most notably, dyslipidemia, cardiovascular diseases, type 2 diabetes, chronic kidney diseases, and various types of cancers (Santos et al., 2019, p. 173). In prevalence and occurrence data, there are an estimated 1.12 billion obese individuals the world over accounting for the 20% of the world's adult population (Santos et al., 2019, p. 173). Obesity is a growing public health menace which informs this in depth exploration of the association between obesity and periodontitis.

Association between Periodontitis and Obesity

Obesity has been associated with severe periodontitis. In a study conducted by Santos et al. (2019) on a total of 236 adults (18 years and above) (80 obese, 69 overweight, and 87 normal-weight individuals), severe periodontitis was closely associated with obesity (OR = 3.25, 95% CI

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(Kernis, Cornell, Sun, Berry, & Harlow, 1993)

Correct the others

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= 1.27-8.31, $p = 0.01$) and not overweight ($p = 0.59$) (Santos et al., 2019, p. 173, 175). Similarly, a study by Ana et al. (2016) elicited similar results with the researchers here being able to demonstrate a significant association between obesity and prevalence of periodontal disease among the population aged 28-55 years (Ana et al., 2016, p. 1, 2-3). By controlling and adjusting for confounding factors, the researchers in this study were able to demonstrate significant association between obesity and periodontitis with the greatest association being demonstrated between elevated Body Mass Index (BMI) and severe periodontitis (Ana et al., 2016, p. 2-5). Through this study, the researchers were able to conclude that periodontitis was not only associated with obesity but also that obese individuals were at higher risks for the initiation and progression of periodontitis (Ana et al., 2016, p. 1).

The mechanism of association that can explain such findings as were elicited in the two studies reviewed above is poorly understood. However, there are a number of working hypotheses that can try to explain the association seen with the two studies so far. The first school of thought is that the mechanism of association is rooted in the pathogenesis of periodontitis in a background of obesity where systemic inflammation associated with obesity has been shown to increase susceptibility to chronic infectious diseases; explaining how obesity would affect the development of periodontal diseases (Santos et al., 2019, p. 173). However, this does not provide answers as to why periodontitis would be more severe in obesity; enters the second school of thought. *“It has become clear that genetic and environmental factors and socioeconomic and behavioral influences leading to excess caloric intake decreased physical activity, and metabolic and endocrine abnormalities are likely important factors”* (Ana et al., 2016; p. 1). The interaction between these factors likely suggests why severe periodontitis is associated with obesity.

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In support of the proposed mechanism of association between obesity and periodontitis, a study by Ali, Akram and Salman (2016) provide compelling evidence for the nature of the association. The study was conducted with the aim of comparing periodontal health status of patients with normal weight with that of obese patients. The study employed 60 female subjects aged 25-35 years who were divided into three groups based on their BMI, controlled for extraneous factors such as smoking, and measured for plaque index (PLI), bleeding index (GI), and bleeding on probing (BOP) as measures of the subject's periodontal health status (Ali, Akram, & Salman, 2016, p. 178-179). The researchers elicited significantly higher PLI, GI, and BOP scores in the pre-obese group (BMI 25.00-29.99) and obese group (BMI 30.00 and above) as compared to normal weight group (BMI 18.50-24.99) (Ali, Akram, & Salman, 2016, p. 178, 179-180). The connection between the findings of this research and the proposed mechanism of association is that the measures of periodontal health status used in the study such as PLI are among the factors that allow for continued bacterial growth that can lead to the development of periodontitis thus propagating the idea of obesity as predisposing individuals to periodontitis and other periodontal-associated conditions.

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Alternative School Of Thought

Despite the elicited associations between obesity and periodontitis, there are conflicting literatures that have come to life and these hold the contradictory finding that there is no association between population's periodontal status and obesity. One such study by Vallogini et al. (2017) presented the observation of better oral hygiene and periodontal health with fewer comprised teeth among obese adolescents as compared to their normal-weight patients (Vallogini et al., 2017, p. 268, 270). This study was conducted with the aim of assessing the prevalence of caries, quality of oral hygiene and periodontal disease in a cohort of obese (90 obese subjects)

compared to a control group (114 normal-weight subjects (BMI <75⁰)) (Vallogini et al., 2017, p. 269). The overall outlook of data regarding the association between obesity and periodontitis is highly controversial. Systematic reviews have reported a ratio of 1:7 between findings of cross-sectional studies with pediatric patients such that only one in seven such cross-sectional studies showed an interaction between dental caries and obesity (Vallogini et al., 2017, p. 268-269). Among studies suggesting zero association between population's periodontal status and obesity, a bulk of the evidence presented point to the presence of risk factors for both diseases such as dietary factors and socioeconomic status which can provide explanations as to why the two diseases tends to occur together and follow each other in patterns of distribution across the world in terms of prevalence rates categorized by regions (Vallogini et al., 2017, 270-272).

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Commented [v19]: Use results and conclusion from Vallogini et al

References

- Ali, H. O., Akram, M. H., & Salman, A. S. (2016). The effect of obesity on the periodontal health status. *Int. J. Adv. Res. Biol. Sci.*, 3(12): 178-182
- Ana, P., Dimitrije, M., Minic, I., & Mariola, S. (2016). The association between periodontal disease and obesity among middle-aged adults periodontitis and obesity. *Journal of Metabolic Syndrome*, 5(3): 1000208, 1-6
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- Vallogini, G., Nobili, V., Rongo, R., De Rosa, S., Magliarditi, F., D'Anto, V., & Galeotti, A. (2017). Evaluation of the relationship between obesity, dental carries and periodontal disease in adolescents. *European Journal of Paediatric Dentistry*, 18(4): 268-272

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