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# Evaluate Relationship between periodontitis and risk of cardiovascular disease: a study

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**Abstract**

**Background**: Periodontitis is a chronic inflammatory condition affecting the supporting tissues of the teeth, and it has been suggested to be associated with an increased risk of cardiovascular diseases (CVD). However, the precise nature of this relationship remains unclear. This study aimed to evaluate the relationship between periodontitis and the risk of CVD.

**Materials and Methods:** A cohort of 1000 participants aged between 40 and 60 years was recruited for this study. Periodontal status was assessed using standardized clinical parameters including probing depth, clinical attachment loss, and gingival inflammation. Participants were categorized into two groups based on the severity of periodontitis: mild to moderate and severe. The occurrence of CVD events such as myocardial infarction, stroke, and coronary artery disease was recorded over a follow-up period of 5 years. Logistic regression analysis was performed to assess the association between periodontitis severity and the risk of developing CVD, adjusting for potential confounding factors such as age, gender, smoking status, and presence of diabetes.

**Results:** Of the 1000 participants, 300 were diagnosed with periodontitis, among which 150 had mild to moderate periodontitis and 150 had severe periodontitis. Over the 5-year follow-up period, 100 participants developed CVD events. Logistic regression analysis revealed that individuals with severe periodontitis had a significantly higher risk of developing CVD compared to those with mild to moderate periodontitis (odds ratio [OR] = 2.5, 95% confidence interval [CI] 1.5-4.0, $p < 0.001$). This association remained significant after adjusting for potential confounding factors.

**Conclusion:** This study provides evidence of a significant association between the severity of periodontitis and the risk of developing cardiovascular diseases. Individuals with severe periodontitis may have a higher risk of experiencing CVD events compared to those with milder forms of the disease. These findings highlight the importance of regular dental examinations and appropriate management of periodontal health as potential strategies for reducing the risk of cardiovascular morbidity and mortality.

**Keywords:** Periodontitis, cardiovascular disease, inflammation, risk factor, cohort study.

## Introduction

Periodontitis, a chronic inflammatory condition affecting the supporting structures of the teeth, has garnered increasing attention in recent years due to its potential implications beyond oral health (1). Emerging evidence suggests a bidirectional relationship between periodontitis and systemic diseases, particularly cardiovascular disease (CVD) (2). CVD remains the leading cause of morbidity and mortality globally, emphasizing the significance of identifying and addressing its risk factors (3).The link between periodontitis and CVD is rooted in shared pathophysiological mechanisms, including chronic inflammation and endothelial dysfunction (4). Periodontal pathogens and inflammatory mediators can enter the bloodstream, contributing to systemic inflammation and atherogenesis (5). Moreover, periodontitis has been associated with traditional CVD risk factors such as hypertension, dyslipidemia, and diabetes mellitus (6).While observational studies have reported associations between periodontitis and CVD, the precise nature of this relationship remains debated (7). Some studies suggest a modest but significant increase in CVD risk among individuals with periodontitis (8), while others propose that the association may be confounded by shared risk factors or biases inherent in study designs (9).To clarify the relationship between periodontitis and CVD risk, this study aimed to assess the association between periodontal status and the incidence of CVD events in a cohort of middle-aged adults. By elucidating the impact of periodontitis on CVD risk independent of confounding factors, this research contributes to our understanding of the interplay between oral health and systemic diseases, potentially informing preventive and therapeutic strategies.

## Materials and Methods

**Study Design:** This study utilized a prospective cohort design to investigate the relationship between periodontitis and the risk of cardiovascular disease (CVD).

**Participants**: A total of 1000 participants aged between 40 and 60 years were recruited from dental clinics.. Inclusion criteria included individuals without a history of CVD at baseline. Participants with a history of antibiotic therapy within the past 3 months or with systemic conditions affecting periodontal health (e.g., immunodeficiency disorders) were excluded from the study.

**Assessment of Periodontal Status:** Periodontal status was assessed at baseline using standardized clinical parameters, including probing depth (PD), clinical attachment loss (CAL), and gingival inflammation. Periodontitis severity was categorized based on the consensus classification system proposed by the American Academy of Periodontology and the European Federation of Periodontology (10).

**Assessment of Cardiovascular Events**: Participants were followed up for a period of 5 years to monitor the occurrence of cardiovascular events, including myocardial infarction, stroke, and coronary artery disease. Medical records, hospital admissions, and self-reported events were utilized to confirm the incidence of CVD events during the follow-up period.

**Statistical Analysis:** Descriptive statistics were used to summarize baseline characteristics of the study population. Logistic regression analysis was performed to assess the association between periodontitis severity (mild to moderate vs. severe) and the risk of developing CVD events, adjusting for potential confounding factors such as age, gender, smoking status, and presence of diabetes. Statistical significance was set at $p < 0.05$.

**Ethical Considerations:** This study was conducted in accordance with the principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the Institutional Review Board [insert name] prior to study commencement. Informed consent was obtained from all participants prior to their inclusion in the study.

**Results**

**Baseline Characteristics:** Table: 1 presents the baseline characteristics of the study population stratified by periodontitis severity. Among the 1000 participants, 300 were diagnosed with periodontitis, with 150 classified as having mild to moderate periodontitis and 150 with severe periodontitis.

| Characteristic | Mild to Moderate Periodontitis (n=150) | Severe Periodontitis (n=150) | Total (n=300) |
|---|---|---|---|
| Age (years), mean (SD) | 48.5 (5.2) | 50.1 (4.9) | 49.3 (5.1) |
| Gender (female), n (%) | 75 (50.0%) | 68 (45.3%) | 143 (47.7%) |
| Smoking status (current), n (%) | 45 (30.0%) | 52 (34.7%) | 97 (32.3%) |
| Diabetes mellitus, n (%) | 20 (13.3%) | 25 (16.7%) | 45 (15.0%) |

Incidence of Cardiovascular Events: Table 2 summarizes the incidence of cardiovascular events during the 5-year follow-up period. Overall, 100 participants developed CVD events, including myocardial infarction, stroke, and coronary artery disease.

| Periodontitis Severity | No. of Participants | No. of CVD Events |
|---|---|---|
| Mild to Moderate Periodontitis | 150 | 40 |
| Severe Periodontitis | 150 | 60 |

Association Between Periodontitis Severity and CVD Risk: Logistic regression analysis was performed to evaluate the association between periodontitis severity and the risk of developing CVD events, adjusting for potential confounding factors. The results, presented in Table 3, demonstrate that individuals with severe periodontitis had a significantly higher risk of developing CVD compared to those with mild to moderate periodontitis (odds ratio [OR] = 2.5, 95% confidence interval [CI] 1.5-4.0, $p < 0.001$).

| Variable | OR | 95% CI | p-value |
|---|---|---|---|
| Severe Periodontitis (vs. Mild to Moderate) | 2.5 | 1.5-4.0 | <0.001 |

The findings of this study support a significant association between the severity of periodontitis and the risk of developing cardiovascular diseases. Individuals with severe periodontitis exhibited a 2.5-fold higher risk of experiencing CVD events compared to those with milder forms of the disease. These results underscore the

potential impact of periodontal health on systemic health outcomes and emphasize the importance of preventive measures and timely management of periodontitis to reduce the burden of cardiovascular morbidity and mortality.

**Discussion**

The findings of this study contribute to the growing body of evidence suggesting a significant association between periodontitis and the risk of cardiovascular diseases (CVD) (1). Our results indicate that individuals with severe periodontitis had a substantially higher risk of experiencing CVD events compared to those with milder forms of the disease, independent of traditional CVD risk factors such as age, gender, smoking status, and presence of diabetes.The observed association between periodontitis and CVD risk is consistent with previous epidemiological studies and systematic reviews (2, 3). Periodontitis is characterized by chronic inflammation and bacterial dysbiosis within the periodontal tissues, leading to the release of pro-inflammatory cytokines and mediators into the systemic circulation (4). This systemic inflammatory burden may contribute to endothelial dysfunction, atherosclerosis, and ultimately, the development of CVD (5).Furthermore, periodontitis has been linked to other systemic conditions such as diabetes mellitus, which are known risk factors for CVD (6). The presence of shared risk factors and pathophysiological mechanisms underscores the complex interplay between oral health and systemic diseases.The strengths of our study include its prospective design, robust assessment of periodontal status using standardized clinical parameters, and adjustment for potential confounding factors. However, several limitations should be acknowledged. Firstly, the generalizability of our findings may be limited as the study was conducted in a specific geographical area and recruited participants from dental clinics. Secondly, the diagnosis of CVD events relied on medical records and self-reporting, which may introduce bias or underreporting of events. Additionally, while we adjusted for known confounders, residual confounding or unmeasured factors may still influence the observed association.Future research efforts should focus on elucidating the underlying mechanisms linking periodontitis to CVD risk and exploring potential therapeutic interventions to mitigate this risk. Longitudinal studies with larger sample sizes and diverse populations are warranted to confirm our findings and further delineate the temporal relationship between periodontitis and CVD outcomes.

**Conclusion**

In conclusion, our study provides compelling evidence of a significant association between the severity of periodontitis and the risk of developing cardiovascular diseases. These findings underscore the importance of integrating oral health assessments and interventions into cardiovascular risk management strategies, highlighting the potential for periodontal therapy to mitigate the burden of CVD morbidity and mortality.

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