

## Periodontitis is a risk factor for developing cardiovascular diseases

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### Abstract

**Objective:** To find out the link between periodontitis and cardiovascular disease while avoiding chronic infections that lead to heart diseases.

**Methods:** The case-control study was conducted at a tertiary care hospital in Lahore, Pakistan, from October 5, 2017, to January 5, 2018, and comprised patients of cardiovascular disease and healthy controls. Data was collected using questionnaire-based interviews. Data was analyzed using SPSS 20.

**Results:** Of the 146 subjects, 73(50%) each were cases and controls. Among the cases, 48(65.75%) had periodontitis, while 25(34.25%) were free from any history or sign of periodontal infections compared to 16(21.91%) controls who had periodontitis and 57(78.08%) who did not have it ( $p < 0.001$ ).

**Conclusion:** There was a strong association between periodontitis and cardiovascular disease.

**Keywords:** Risk factors, Periodontitis, Cardiovascular, Diseases, Prevalence.

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### Introduction

Oral health offer clues about general health. Periodontitis is one of the commonest diseases that involve the connective tissue destruction and the dental bone loss by periodontal bacteria due to the result of infections in inflammatory hosts.<sup>1</sup> Periodontal diseases involve many stages ranging from minor periodontal infections, like gingivitis, to severe periodontitis.<sup>2</sup> In the United States, about 75% individuals are affected with this disease.<sup>3</sup> This disease is evaluated by the redness of gums, their swelling, inflammation and frequent bleeding of gums. In the US, moderate periodontitis is present in 30% while 10% of the population is affected by advanced form of the disease.<sup>4</sup>

Systemic inflammation can be elevated by destructive immune response that could be generated by systemic inflammation due to periodontal disease. The periodontal infections and systemic infections, including cardiovascular diseases (CVDs), are related to each other and this relation plays an important part in periodontal researches as clinical backgrounds, systemic inflammatory problems and periodontitis linking with each other is a concept going as far back as the early 1980s.<sup>5</sup> The current study was planned to explore this relationship further.

### Patients and Methods

The case-control study was conducted at a tertiary care hospital in Lahore, Pakistan, from October 5, 2017, to January 5, 2018, and comprised CVD patients and healthy controls. The sample size was calculated using epitools

software with prevalence rate of 0.453 and odds ratio (OR) of 1.92.<sup>6</sup> Patients from the Cardiology Department were considered the cases, while patients from other departments were taken as controls. The simple random sampling method was used to select the samples. Groups were age-matched. Patients with cardiac diseases included coronary artery disease (CAD), cardiomyopathy (CMP), heart valve disease (HVD) and heart attack. Symptoms and other diagnostic tools were used for case selection. Edentulous patients were excluded.

Data was collected using face-to-face interviews with the help of a questionnaire that had 4 sections: demographic information; CVD information; periodontitis information; and other potential risk factors. Before collecting information, patients were briefly informed about the questionnaire and purpose of the study.

Data was analysed using SPSS 20. ORI was calculated to find the association between periodontitis and specified CVD. Chi-square test was applied to find the association. Different parameters evaluated for the cases were confirmed by clinical diagnosis, while parameters used for periodontitis included gums swelling, bleeding gums, periodontal pockets etc.  $P < 0.05$  was considered significant.

### Results

Of the 146 subjects, 73(50%) each were cases and controls. Among the cases, 48(65.75%) had periodontitis, while 25(34.25%) were free from any history or sign of periodontal infections compared to 16(21.91%) controls who had periodontitis while 57(78.08%) did not have it ( $p < 0.001$ ) (Table-1).

CAD, CMP, HVD and heart attack had significant association

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**Table-1:** Periodontitis relationship with cardiovascular disease (CVD).

CVDs	Periodontitis			OR	p-value	95%C.I.	Chi-square
	Yes	No	Total				
Yes	48	25	73	6.840	<0.001	3.278-14.247	28.488
No	16	57	73				
	64	82	146				

CI: Confidence interval; OR: Odds ratio.

**Table-2:** Perionitis with individual cardiovascular disease (CVD).

Variable Name	Description	No. of cases	No. of controls	Chi-square	OR	95%C.I.	p-value
Periodontitis with Coronary Artery Disease	Yes	16	4	12.311	6.500	2.052-20.593	< 0.001
	No	48	78				
Periodontitis with Heart Valve Disease	Yes	10	4	4.799	3.611	1.076-12.114	0.028
	No	54	78				
Periodontitis with Heart Attack	Yes	16	7	7.341	3.571	1.369-9.320	0.007
	No	48	75				
Periodontitis with Cardiomyopathy	Yes	8	3	4.033	3.762	0.956-14.816	0.045
	No	56	79				

CI: Confidence interval; OR: Odds ratio.

with periodontitis (Table-2).

**Discussion**

The study found that 48 (65.7%) of the cases suffered with periodontitis, indicating a very strong association with periodontitis and heart disease. These results are supported by earlier findings.<sup>7,8</sup>

Recent evidence has suggested that chronic inflammations, among then dental infections, particularly the periodontal disease, are involved in the pathogenesis of CAD.<sup>9</sup> It is an alarming evidence that periodontal diseases could play an important role in the initiation and progression of CVDs.<sup>10</sup> HVD is a major public health concern, and a significant rise in its prevalence with age has been observed.<sup>11</sup> The present study found a strong association between HVD and periodontitis which is in line with studies showing porphyromonas gingivalis being one of the major opportunistic periodontal pathogens.<sup>12</sup>

The link between periodontitis and heart attack is inflammation, or swelling, which leads to hardening of arteries, and is called atherosclerosis. The current study showed significant association between the two conditions, and the finding is supported by as earlier study.<sup>13</sup>

The biological principle that relate periodontitis and myocardial infarction (MI) include direct effects of periodontal bacteria and indirect effects of host mediators, the lipopolysaccharides effects, endotoxins released by the bacteria and effects of activated polysaccharides. A study showed that the vesicles on the outer membrane of porphyromonas (P.) gingivalis were an important feature of

CVD formed by lipid cells, and act as oxidation of low-density lipopolysaccharides and rupture atherosclerotic plaques.<sup>14</sup> Some bacteria of oral microbial habitat, such as P. gingivalis and streptococcus species, have specific surface proteins that are similar to platelets' activating collagen proteins that aggregate platelets and cause cerebral or cardiac ischaemia when they form a thrombus.<sup>15</sup> Other studies have also reported a relationship between periodontitis and MI.<sup>17</sup>

**Conclusion**

The association between periodontitis and CVDs was significant, indicating that periodontitis is a risk factor for CVDs. The finding leads to the convergence of dental and medical cardiac care.

**Disclaimer:** The text is based on an M.Phil thesis.

**Conflict of Interest:** None.

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