



## Association between Periodontal Disease and Cardiovascular Disease

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### Abstract

There has been recent surge of information in various studies that have demonstrated that there may be correlations between heart disease and periodontitis. We must anticipate at this point in time that there do appear some connections between periodontitis and cardiovascular disease. There seems an apparent possibility that the patients who are at risk for one disease may be genetically at risk for another.

### Keywords

Cardiovascular, Periodontitis, Coronary diseases

### Epidemiology

In developed countries cardiovascular (CV) diseases are the reason of death in 50 percent of the patients and certainly CV diseases is the number one reason of deaths in the U.S.

In the most recent National Health and Nutrition Examination Survey (NHANES) 45 percent of U.S. adults (30 years +) had periodontitis.

A cohort study conducted by De Stefano et al. [1] showed that patients with periodontitis have 25 percent more risk of coronary artery disease as compared to those without it.

A case control study by Grau et al. [2] was conducted on nearly 300 patients after ischemic stroke. It was determined that periodontitis is an independent risk factor for stroke following his research.

An observational study conducted on patients admitted to hospital emergency for acute coronary diseases had very poor periodontal status as compared to healthy controls.

### Risk Factors

Periodontitis and CV diseases have common risk factors such as- Smoking, Obesity, Diabetes Mellitus and Hypertension. Large observational studies conducted over time have shown that inflammation, auto-immune mechanism and host response play a common role in both initiation and progress of these diseases [3].

### Role of Inflammatory Mediators

The important mediators of inflammation include

- Nuclear factor- $\beta$ (NF- $\beta$ )
- Interleukin-1 (IL-1)
- Tumor Necrosis Factor (TNF-)
- Matrix Metalloproteinases (MMPs)
- C-reactive protein (C-RP)
- Interleukin-6 (IL-6)
- Interferon- $\gamma$

These markers are actively involved with connective tissue breakdown in both myocardial and periodontal tissues [4]. They further limit the repair activity inside tissues through expression of apoptosis matrix producing cells. MMPs play an important role in collagen breakdown hence leading to connective tissue degeneration.

### Biological Plausibility

Meta-analysis study conducted by Danesh et al [5] demonstrated a weak connection between heart conditions and H. Pylori (*Helicobacter Pylori*).

Pathogens that have been studied include Herpes Simplex Virus (HSV), Hepatitis a virus, Chlamydia Pneumoniae and Cytomegalovirus (CMV). There is a stronger link between Chlamydia and CMV with CV disease as compared to H. Pylori. However no proved conclusion has been reached.

Zhu et al [6-12] conducted a study and concluded that there was an increase in association between presence of Serum IgG antibodies to Hepatitis A virus and coronary artery disease. This study also highlighted the increased levels of CRP (C-reactive protein) in coronary artery disease subjects [13].

Research from most recent times emphasise on assessing the total pathogenic burden and its effects on heart diseases rather than studying the role of an individual pathogen in CV diseases [7].

However, the increased level of CRP and its correlation with CV diseases is one of the very consistent finding from almost all major studies done so far [12].

There are conflicting results on whether by products of DNA of putative pathogens like Toxins; Lipopolysaccharides (LPS) [11] travelling through the system contribute to formation of atherosclerotic plaques, which could possibly contribute to an acute myocardial infarction (MI).

Many questions seem unanswered at this point in time to link direct dots between periodontal and cardiovascular diseases. The direct role of periodontal pathogens in CV diseases is not convincingly proved yet.

### Effects of Periodontal Treatment on Cardio Vascular Diseases

A retrospective cohort study on nearly 800000 patients with/ without periodontal disease reported that risk of acute MI/ Myocardial Infarction [8] was higher in patients with untreated periodontal

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disease as compared to ones that received periodontal treatment.

The data from another Study depicted that poor responders to advanced periodontal treatment have been reported to have a higher incidence rate ratio for heart diseases (95% CI=1.07-1.54; p value=0.007). Thus progression of heart diseases and recurrence of acute MI episodes can be thought to be linked to the success of periodontal treatment in the affected subjects.

Another prospective cohort pilot study conducted by Beck J. Garcia [9] in 25 patients who had Generalised Chronic Periodontics (GCP) and Refractory Hypertension showed a huge reduction in many cardiovascular risk markers after periodontal treatment.

However, prospective cohort study by NHANES [10] (National Health and Nutritional Health Examination Survey) has shown no changes in the level of inflammatory mediators after periodontal treatment.

### Conclusion

Based on the research conducted so far it is indicated that more Randomized Controlled Trials (RCTs) and longitudinal studies are required with prolonged follow-up periods to establish a definitive conclusion regarding the possible links between Periodontitis and CV diseases.

There seems a fair responsibility that the apparent association between these two diseases can be attributed to the common risk factors and underlying common pathophysiologic events.

Until then it's premature to counsel our patients 'To floss or die'.

### References

1. DesStefano, Anda RF, Kahn HS, Williamson DF, Russell CM, et al. (1993) Dental Disease and risk of coronary heart disease and mortality. *BMJ* 306:688-691.
2. Grau AJ, Becher H, Ziegler CM, Lichy C, Bugge F, et al. (2004) Periodontal disease as a risk factor for ischemic stroke. *Stroke* 35: 496-501.
3. Danesh J, Collins R, Peto R (1997) Chronic infections and coronary heart disease: Is there a link? *Lancet* 350:430-436.
4. Fiehn N-E, Larsen T, Christiansen N, Holmstrup P, Schroeder TV, et al. (2005) Identification of periodontal pathogens in atherosclerotic vessels. *J Periodontol* 76: 731-736.
5. Zhu J (2000) Effects of total pathogen burden on coronary artery disease risk and c-reactive protein levels. *Amer J Cardiol* 85: 140-146.
6. Graves DT, Cochran D (2003) The contribution of interleukin-1 and tumor necrosis factor to periodontal tissue destruction. *J Periodontol* 74: 391-401.
7. Gupta S. (1999) Chronic infection in the aetiology of atherosclerosis – focus on *Chlamydia pneumoniae*. *Atherosclerosis* 143: 1-6
8. Zhu J, Nieto J, Horne BD (2001) Prospective study of pathogen burden and risk of myocardial infarction or death. *Circulation* 103: 45-51.
9. Beck J, Garcia, Heiss G, Vokonas P, Offenbacher S, et al. (1996) Periodontal disease and Cardiovascular disease. *J Periodontal* 67:1123-37
10. Mattila KJ, Nieminen MS, Valtonen VV (1989) Association between dental health and acute myocardial infarction. *BMJ* 298:779-781.
11. RCDSO (2005) Symposium.
12. Rosenberg HM, Ventura SJ, Maurer JD, Jenkins D, Kaster C, et al. (1995) Births and deaths United States. Monthly vital statistics report 45:31.
13. Zhu J, Quyyumi AA, Norman JE (2000) The possible role of hepatitis A virus in the pathogenesis of atherosclerosis. *J Infect Dis* 182: 1583-1587.

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