

## Assessment of Periodontal Status in Patients Suffering From Coronary Artery Disease



### Medical Science

**KEYWORDS :** Periodontal Disease, Coronary Artery Disease, Atheroma, Inflammation

<b>MAJOR SATISHA T S</b>	BDS, MDS Periodontics, Graded Specialist (Periodontics), Army Dental Centre (Research And Referral), Delhi Cantt
<b>LT COL ANIL KUMAR JHA</b>	BDS, MDS Periodontics, Officer Commanding, Military Dental Centre, Namkum, Ranchi
<b>COL (RETD) SK OJHA</b>	BDS, MDS PERIODONTICS, SECRETARY, DENTAL COUNCIL OF INDIA, NEW DELHI
<b>DR RADHIKA N B</b>	BDS, MDS ORTHODONTICS, SENIOR LECTURER, DEPT OF ORTHODONTICS AND DENTOFACIAL ORTHOPEDICS, IDEAS DENTAL COLLEGE, GWALIOR, MADHYA PRADESH

### INTRODUCTION

Cardiovascular diseases are currently considered as the major health problem. In 2002, 16.7 million people died of cardiovascular diseases worldwide. Among these deaths, 7.2 million (3.8 million men and 3.4 million women) were due to coronary heart disease. They represent the major cause of death in the industrialized countries and its pathological base is atherosclerosis<sup>1</sup> and it is associated with significant morbidity and mortality. Majority of global burden of this disease is occurs in developing countries. Although rates are declining in many developed countries, the disease has shown an increasing trend in developing and transitional countries, partly as a result of increasing longevity, urbanization, and lifestyle changes<sup>2,3</sup>

Periodontal diseases, including gingivitis and periodontitis, are among the most common infectious diseases in humans caused by bacteria and bacterial products of dental plaque. It has been hypothesized that the chronic inflammatory burden of periodontal diseases and the host response to this inflammation may be involved in the development of cardiovascular diseases. A number of studies in recent years have attempted to examine the potential relationship between periodontal diseases and cardiovascular diseases. Several prospective studies have demonstrated a significant association between periodontal infection and atherosclerosis or coronary heart disease. In addition, several case-control and cross-sectional studies with different populations measuring periodontal diseases and clinical endpoints have found similar association<sup>4-6</sup>. However based on current evidence the association between periodontal diseases and coronary heart disease remains controversial<sup>7</sup>.

The results of the epidemiological studies demonstrated that periodontal diseases are the most common infectious diseases in the world and are caused by dental plaque microorganisms, the effects of which are modified by other important local and systemic factors. Chronic periodontitis is a common disease that can occur in most age groups. The most prevalent are among adults and seniors worldwide.<sup>8</sup>

Both diseases are common conditions affecting health of people worldwide and the association between these conditions has remained controversial. In addition, several studies have assessed the association between periodontal diseases and acute coronary syndrome in many different populations but data is still scarce<sup>9</sup>

In Indian subcontinent, cardiovascular disease causes more than 25% of deaths. The demographic factor, health, and social impact of this disease will increase over the next few decades, due to the aging of the population, and will pose a major public health challenge. It has been projected that by 2020, cardiovascular diseases will be the leading causes of death and disability worldwide<sup>10</sup>. It has been predicted that these diseases will increase rapidly in India and this country will be host to more than half the cases of heart disease in the world within the next 15 years<sup>11</sup>. In view of these factors a study was undertaken to

assess the periodontal status of subjects with Coronary artery disease.

### MATERIAL AND METHODS

#### Methods:

60 subjects were recruited from the Dept of Cardiology and dept of medicine, Military Hospital (Cardio Thoracic Centre) aged 30 to 60, mean age 51 years) (40 male and 20 female patients). Upon cardiac catheterization, all the patients were examined by the cardiologist based on the classic symptoms for chest pain, ECG changes and confirmation by Angiograph. The following dental, medical, and social histories were recorded: number of dental visits/year, frequency of brushing/day and flossing / week, tobacco use, presence/absence of hypertension, diabetes, HDL and LDL levels total cholesterol level, and the highest level of education completed.

All the subjects underwent oral examination which consisted of documented the number of teeth present, gingival bleeding index, probing pocket depth, gingival recession and clinical attachment loss (CAL). William's periodontal probe, mouth mirror and explorer were used in oral examination. Russel's periodontal index was used to assess the periodontal disease. Based on the Finding and charting of the data, periodontal disease. Co relation of the severity of periodontitis with the number of teeth with CAL > 3mm was done.

### STATISTICAL ANALYSIS

Descriptive statistics were used in this study describing the status of the parameters that were assessed. The other statistical tests included co-relating the severity of periodontal disease with number of teeth exhibiting attachment loss greater than 3mm indicating the presence of Periodontal disease.

### RESULTS

The mean age of the subjects recruited for the study were 51 years and were married, and most of the subjects had an education up to matriculation. All the subjects had a mean body mass index of 26.2, and 35 of the subjects had Diabetes and 48 subjects had hypertension. 41 subjects were smokers. Serum cholesterol levels were 157.3± 23.39mg. Total Leukocyte Counts were 8979.90 ± 230.30. The mean numbers of teeth present were 24 ±3.5. Mean clinical attachment loss of 5.83±1.3 mm was seen. The number of teeth with CAL >3mm were 12 ±4.3. The percentage of sites which bleed on probing was 40%. The mean Russel's index score were 3.1±0.4. On co-relation of the number teeth with CAL more than 3 mm. with serum cholesterol showed a proportional relationship. The patient having high levels as total leukocyte counts were having elevated number of teeth with clinical attachment loss greater than 3mm.

The significant confounding factors for the present study were found to be age and gender. The periodontal condition of the 50 subjects was clinically diagnosed as gingivitis and/or mild periodontitis. Analysis of the data after adjusting for the age and gender demonstrated a statistically significant association

between BOP and CAD in patients. Significant associations were found between PD, CAL, number of missing teeth, and CAD.

**DISCUSSION**

Coronary heart disease (CHD) is the leading cause of adult morbidity and mortality throughout the world. Myocardial infarction (MI) and unstable angina are common manifestations of this disease. Acute coronary syndrome (ACS) is the term used to describe patients who present with either acute myocardial infarction or unstable angina.<sup>1</sup>

The development of CHD can result from genetic and several environmental risk factors such as age, abnormal serum lipids, diabetes, smoking and hypertension. These well-known risk factors independently or in combination are involved in both acute myocardial infarction (AMI) and atherosclerosis. Several studies in different populations have suggested that atherosclerosis and the occurrence of AMI could be linked with chronic oral infections. It has been hypothesized that the chronic inflammatory burden of periodontal disease and the host response to this inflammation may contribute to atherogenesis and thromboembolic events in the development of CHD and therefore causes myocardial infarction<sup>12</sup>. The associations between periodontal disease and coronary heart disease (CHD) have been explored in many studies. Several studies assessed and reported on the relationship between periodontal disease and CHD. Some studies suggest that having a periodontal disease (gingivitis or periodontitis) can increase the risk of atherosclerosis, coronary disease, and myocardial infarction. Destefano et al showed that subjects with periodontitis had 25% increased risk of developing heart disease compared to those with little or no periodontal disease<sup>13</sup>. The study by Beck et al confirmed the findings of these investigators, indicating that periodontal disease may be a risk factor for coronary heart disease. They reported that subjects with the most severe probing depth and bone loss at baseline had higher risk for developing coronary heart disease than those with minimal periodontal disease<sup>14</sup>.

Joshiyura et al. did not find any overall association between periodontal disease and coronary heart disease in their study of male health professionals, except when they considered tooth loss along with self-reported periodontal disease<sup>15</sup>. Hujoel P et al. agreed with others who did not find any relationship between periodontal and coronary heart disease in their published prospective cohort study involving 8,032 patients with periodontal and medical evaluation who were followed for about 10 years. The endpoints evaluated were coronary death, hospital admission for ACS, or need for myocardial revascularization during this period. After adjustment for cardiovascular risk factors, no association was found either between gingivitis and CAD, with an Odds Ratio of 1.05 (95% CI 0.88-1.26), or between periodontitis and CAD, with an Odds Ratio of 1.44 (95% CI 0.96-1.36)<sup>16</sup>. In another study the presence of periodontitis was not related to increased CVD risk but may be associated with hyperlipidemia<sup>17</sup>. Although, several studies have found an association between periodontal disease and the risk of coronary heart disease (CHD), independent of a variety of potential confounders, few others have reported no association between periodontal disease and CHD.

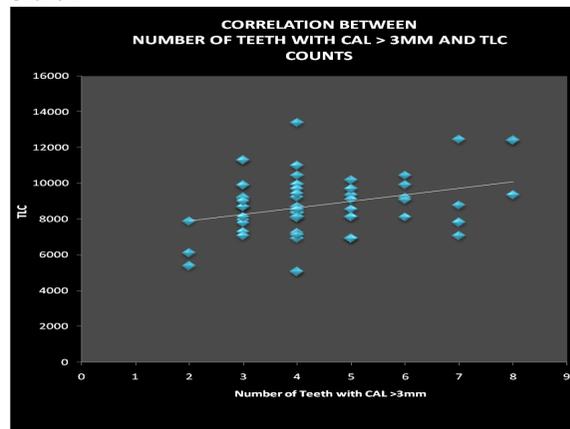
Whether the assessed periodontal parameters prove to be risk factors for coronary artery disease remains to be demonstrated in future periodontal treatment intervention studies. However, our study links gingival inflammation with CAD, specifically with acute infarction. A possible link between gingivitis or early periodontitis and CAD is that both conditions are preceded or accompanied by an inflammatory process. Both conditions are chronic in nature with acute episodic manifestations. Future studies may focus on gingival inflammation rather than bacterial invasion, while investigating the relationship between gingival health and CAD. Although periopathogens have been detected in carotid and coronary atheromas,<sup>[1,2]</sup> their exact role needs to be investigated further. Additional studies are necessary to better define the relationship between periodontal conditions and coronary artery disease. A larger sample, representative of the general population in terms of socioeconomic factors

and demographics along with alveolar bone level assessment, would be necessary to determine the nature of the association. In future investigations, a major challenging variable remains, i.e., the genetic susceptibility for both CAD and periodontitis a major challenging variable remains to be answered.

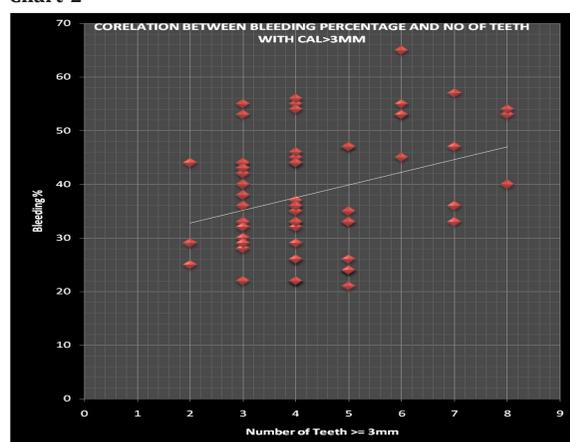
**CONCLUSION**

The main intent of the present study was to assess the periodontal status of patients presenting with coronary heart disease. The present study demonstrates the association between and coronary disease. However, further longitudinal epidemiological study would be necessary to confirm the link between periodontal disease and ACS, and to establish the causal relationship between the two conditions. Studies involving larger number of patient, better-controlling for confounding factors, studying in socially homogeneous populations and using specific measurement of periodontal disease are required to identify a definite association between periodontal disease and the risk of ACS. Moreover, the analysis of other risk markers, genetic, and serology may contribute to a better understanding of the role of inflammatory and infectious process in the development of coronary artery diseases. If a cause-effect relationship between periodontal disease and ACS has been approved, the prevention and treatment of periodontal disease will certainly be an important tool for prevention of CHD, which is one of the major causes of death and disability in our country.

**Chart-1**



**Chart-2**



## REFERENCE

1. American Heart A. Acute Coronary Syndrome: what is acute coronary syndrome? | 2005; Available from: <http://www.americanheart.org/presenter.jhtml?identifier=3010002>. | 2. Mackay J, Mensah G.(2004) Atlas of heart disease and stroke. WHO Publications. | 3. Bureau of Health Policy and Strategy, Health Information Unit. Number and Death Rates per 100,000 Population of First 10 Leading Cause Groups of Death. 2000- 2004; Available from: <http://bps.ops.moph.go.th/Death.html>. | 4. Persson R, Hollender L, Powell V, (2002). Assessment of periodontal conditions and systemic disease in older subjects. II. Focus on cardiovascular diseases. *J Clin Periodontol* 29:803-10. | 5. Arbes S, Slade G, Beck J,(1999) Association Between Extent of Periodontal Attachment Loss and Self-reported History of Heart Attack: An Analysis of NHANES III Data. *J Dent Res*;78(12):1777-82. | 6. Elter J, Champagne C, Offenbacher S, (2004) Relationship of Periodontal Disease and Tooth Loss to Prevalence of Coronary Heart Disease. *J Periodontol* ;75:782-90. | 7. Khader Y S, Albashaireh ZS, Alomari MA, (2004) Periodontal Diseases and the Risk of Coronary Heart and Cerebrovascular Diseases: A Meta-Analysis. *J Periodontol*2004;75:1046-53. | 8. Mattila K, Nieminen M, Valtonen V (2008) Association between dental health and acute myocardial infarction. *Br Med J* (298):779-82. | 9. Cueto A, Mesa F, Ocana-Riola R. Periodontitis as risk factor for acute myocardial infarction (2005).A case control study of Spanish adults. *J Periodont Res* ;40 :36-42. | 10. World Health Organization. The World Health Report 2002. Geneva, Switzerland: WHO Publications | 11. Reddy KS. Rising burden of cardiovascular disease in Indians. (2001)Coronary artery | disease in Indians. A global perspective. Mumbai; Cardiological Society of India | 12. . Albandar J. Epidemiology and risk factors of periodontal diseases. (2005) *Dent Clin North Am*2;49 (3):517-32. | 13. DeStefano F, Anda R, Kahn H, et al (2001) Dental disease and risk of coronary heart disease and mortality. *Br Med J*;306:688-91. | 14. Liebana J, Castillo A, Alvarez M, et.al. (2004) periodontal disease: microbiological considerations. *Med Oral Patol Oral Cir Bucal* ; 9 suppl: 75-91. | 15. Hujjel P, Drangsholt M, SPiekerman C, et.al (2001) Examining the link between coronary heart disease and the elimination of chronic dental infections. *J Am Dent Assoc* 132:883-9. | 16. Socransky S, Haf-fajee A. (2001) The bacterial etiology and progression of destructive periodontal disease: current concept. *J Periodontol* 63:322-31. | 17. Persson GR, Ola O, Thomas P, et al. (2001) Chronic periodontitis, a significant relationship with acute myocardial infarction. *European Heart Journal* 24:2108:15.