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# Is periodontitis an independent risk factor for subclinical atherosclerosis?

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ABSTRACT

*Objectives:* The aim of this study was to assess the interrelationship between periodontitis and atherosclerosis by comparing the ultrasound and clinical markers of atherosclerosis in systemically healthy patients with and without periodontitis and whether periodontitis can be an independent risk factor for atherosclerosis.

*Materials and methods:* Total 40 subjects, of same socioeconomic status, belonging to age group of 35–65 years, were recruited and divided into two groups - Group I (Chronic Generalised Periodontitis without any systemic disease: CP-SH), Group II (Normal healthy patients without periodontitis and any systemic disease - SH). Clinical measurements and ultrasound examinations were carried out. Qualitative variables were analyzed using Chi square test and qualitative variables using Unpaired Student t test. Statistical significance was accepted for $p \leq 0.05$.

*Results:* Carotid ultrasound revealed right and left intima media thickness (IMT) of $0.626 \pm 0.016$ mm and $0.715 \pm 0.037$ mm respectively in cases versus $0.495 \pm 0.009$ mm and $0.518 \pm 0.009$ mm respectively in controls, with the difference being statistically significant. In cases, mean diastolic blood pressure (DBP) was $83.45 \pm 4.07$ mmHg versus $79.25 \pm 3.63$ mmHg in controls, with the difference being statistically significant.

*Conclusion:* In this study, we found statistically significant differences in carotid IMT and DBP values between cases and controls. These findings suggest independent role of periodontal disease in subclinical atherosclerosis.



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## Introduction

Periodontitis is a chronic inflammatory disease of tissues surrounding the teeth caused by specific anaerobic pathogens. The destructive process of periodontitis is thought to begin with the accumulation of biofilms which contain significant bacterial masses on the tooth surface at or below the gingival margin. Periodontal destruction is thought to occur as a result of the host inflammatory response against these bacteria and from release of toxic products from the pathogenic plaque. The potential impact of many systemic disorders on the periodontium is well-documented. Also, evidence suggests that periodontal infection may significantly enhance the risk for **certain systemic diseases or alter the natural course** of systemic conditions [1]. Conditions in which the influences of periodontal infection are documented include coronary heart disease (CHD) and CHD-related events such as angina and myocardial infarction, atherosclerosis, stroke, diabetes mellitus, preterm labor, low birthweight delivery, and respiratory conditions.

Cardiovascular diseases (CVD), which globally rank first in the list of morbidity and mortality, are common in many adult populations. Over the last 15 years, several studies have reported epidemiological associations between periodontitis and cardiovascular diseases [2,3]. Chronic inflammation plays a role in atherosclerosis by influencing the risk, manifestation, and progression of vascular events. Periodontitis has been associated with CVD, although causality still needs to be confirmed. Atherosclerosis is the main underlying vascular disease responsible for cardiovascular and cerebrovascular mortality and morbidity. The progression of atherosclerosis and the triggering of cardiovascular events involves the intervention of a series of risk factors, such as age, smoking, hypertension, diabetes and hypercholesterolemia.

The intima-media thickness (IMT) of the carotid artery is a histopathologically validated measure or marker of atherosclerosis [4]. Measurement of this parameter is strongly correlated to disease of the coronary arteries as well as to disease of the cerebral arteries and thus represents a good predictor of both cardiovascular and cerebrovascular ischemic event. **B-mode ultrasonography** is a non-invasive, less time consuming and highly reliable tool for assessing the early stages of atherosclerosis by measuring IMT.

A direct relationship between the levels of subgingival periodontal bacteria and systolic blood pressure (SBP) and diastolic blood pressure (DBP) as well as hypertension prevalence has been described in subjects with no history of stroke or myocardial infarction.

Therefore, the aim of the study was to assess the interrelationship between periodontitis and atherosclerosis by comparing the ultrasound and clinical markers of atherosclerosis in systemically healthy patients with and without periodontitis and also to assess whether periodontitis can be an independent risk factor for atherosclerosis.

## Materials & methods

For this study, total 40 subjects, of same socioeconomic status, belonging to age group of 35–65 years, were recruited from patients visiting **Department of Periodontology, Rishiraj College of Dental Sciences and Research Centre, Bhopal.** The patients were grouped accordingly -

1. Group I: 20 cases of Chronic Generalised Periodontitis without any systemic disease **(CP-SH)**
2. Group II: 20 normal healthy patients (control) without periodontitis and any systemic disease **(SH).**

Inclusion criteria - CP-SH group **(AAP, 1999)** [5]**:** number of teeth $\geq 16$, presence of $\geq 5$ mm probing pocket depth (PPD) in more than 30% sites, presence of $\geq 3$ mm clinical attachment loss (CAL) in more than 30% sites and radiographic evidence of bone loss. SH group: number of teeth $\geq 20$ teeth, presence of PPD $\leq 3$ mm, no clinical attachment loss and no radiographic sign of alveolar bone loss.

Exclusion criteria - patients with history of diabetes mellitus, hypertension or any other systemic diseases and conditions, history of/family history of cardiovascular diseases, obese (BMI$>$30) patients, pregnant or lactating females, smokers and alcoholics, patients who had undergone periodontal therapy during last 6 months and patients who had taken any antibiotics/anti inflammatory/hormonal drugs in past 3months.

This study was carried out over a period of 1 year. Ethical clearance was obtained from the Ethical Committee of Rishiraj College of Dental Sciences and Research Centre, Bhopal. Written informed consent was obtained from the subjects, according to Declaration of Helsinki, before starting the study. Through an interview process, an extensive medical history was compiled for each patient. BMI values were calculated from the anthropometric data (weight [in kilograms] divided by height squared [square meters]); patients exceeding 29.9 kg/m$^2$ were considered obese.

### *Clinical measurements*

Clinical periodontal recordings were performed using William's graduated periodontal probe (Hu-Friedy, Chicago, IL) on all the teeth, with the exception of the third molars. All measurements were performed by a single trained expert in periodontitis. Full mouth gingival bleeding index, PPD and CAL were recorded. Orthopantamographs (OPGs) of patients in CP-SH group were taken to show the radiographic evidence of bone loss. The diagnosis of periodontitis was defined by the percentage of sites with CAL $>3$ mm: 1% to 32%= mild; 33% to 66% = moderate; and 67% to 100% = severe [6].

### *Diastolic blood pressure*

Diastolic blood pressure was measured in right antecubital fossa using calibrated mercurial sphygmomanometer (Diamond, Industrial Electronic & Allied Products, Pune) and