

ORIGINAL RESEARCH

Evaluation of Periodontitis as Risk Factor for Atherosclerosis: A Clinical Analysis

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Received: 02 June, 2022

Accepted: 05 February, 2023

ABSTRACT

Introduction: Cardiovascular disease (CVD) is a common and complex disease, especially in middleaged people those over 50 years old. The aim of this study was to compare the plasma levels of the established risk markers for atherosclerosis (such as lipoproteins, C-reactive protein and fibrinogen) in patients with periodontal disease and healthy patients. **Materials & Methods:** The study population included total of 50 patients. The populations were divided into two groups. The group A periodontitis consists of 25 patients and the second group B non periodontitis group consist of 25 patients. All patients underwent a comprehensive periodontal examination, including radiographs and clinical examination. **Results:** In agreement with other studies, we found significant differences in total cholesterol and LDL levels between periodontitis and non-periodontitis cases, which may account for the correlation between periodontal and cardiovascular diseases, to which high cholesterol and LDL levels are known risk factors. **Discussion:** The inflammation of periodontium is caused by bacteria, primarily by gram negative anaerobic bacteria. The link between periodontal disease and cardiovascular health is strong, and it's clear that the two are intertwined. Researchers discovered that the bacteria causing disease can spread throughout the blood via blood stream producing inflammation in heart vessels and infection in heart valves.

Keywords: Attachment loss, Atherosclerosis, Heart diseases, Inflammation, Periodontitis

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INTRODUCTION

Cardiovascular disease (CVD) is a common and complex disease, especially in middleaged people those over 50 years old; its morbidity, disability, and mortality rates are relatively high, posing a serious threat to human health. Every year, the number of people dying from CVD is as high as 17 million, ranking first among all causes of death. Ischemic heart disease, stroke, heart failure (HF), cardiomyopathy, and atrial fibrillation (AF) account for more than 95% of cardiovascular-disease-related deaths.¹⁻³

The major contributing factor in the majority of cases of cardiovascular disease (CVD) and cerebrovascular disease (stroke) is atherosclerosis. One of the outcomes of this disease process is the narrowing of the arteries resulting from subendothelial deposition of cholesterol, cholesterol esters, and calcium within the vessel walls. These cholesterol-rich plaques also contain a variety of cell types, including fibroblasts and immune cells. Rupture of the atherosclerotic

plaques yield thrombi that travel distally to occlude the artery, resulting in myocardial infarction or stroke.^{4,5}

Periodontitis is one of the most common inflammatory diseases worldwide, with an incidence rate of 20–50%. Periodontitis is common in adults, and is the sixth most prevalent disease globally, characterized by the gradual disintegration of the tooth-supporting apparatus. The World Health Organization reports that periodontitis is the leading cause of tooth loss in adults. Dental caries and periodontitis are prevalent in adults, especially in individuals who are older, leading to momentous health and financial burdens.⁶⁻⁸

Epidemiological studies have indicated that severe loss of support structure and tooth loss caused by advanced periodontitis affect ~15% of the world's population, mainly affecting adults, and whose morbidity increases with age in all populations. Familial and twin studies have emphasized the role of genetics in chronic periodontitis.⁹

Inflammation may enhance the risk of atherosclerotic plaque for rupture because it puts the collagen fibril of

the fibrous cap under a double attack of low synthesis from the smooth muscle cells and high degradation from macrophages.^{10,11} Plaque rupture is followed by coronary thrombosis, which clinically is expressed as the acute coronary syndrome. The aim of this study was to compare the plasma levels of the established risk markers for atherosclerosis (such as lipoproteins, C-reactive protein and fibrinogen) in patients with periodontal disease and healthy patients.

MATERIALS & METHOD

The present study was carried out at in the collaboration with the out patients department of the dental college & medical hospital. This prospective multicenter center study was carried out after the development of an experimental protocol. The study was done or the period of 6 months interval, with the age range of 30 years to 70 years. The ethical committee was informed about the study and the ethical clearance certificate was obtained prior to the start of the study. The included patients were informed about the purpose of the study and the informed consent was signed prior to the start of the study.

The study population included total of 50 patients. The populations were divided into two groups. The group A periodontitis consists of 25 patients and the second group B non periodontitis group consist of 25 patients. The criteria for inclusion in the study were: the occurrence of periodontitis, age up to 65 years, obtaining written consent for the research, and publication of results. Exclusion criteria: acute inflammation of the respiratory tract, urinary tract, neoplastic disease, rheumatic disease, autoimmune disease, chronic liver disease, chronic kidney disease in stages 4 and 5, and a history of stroke.

Clinical Examination for Periodontal Disease All patients underwent a comprehensive periodontal examination, including radiographs and clinical examination. Probing depth and attachment loss were calculated using a calibrated periodontal probe, which enabled control of probing forces up to 200 N/cm². Probing depths >3mm were considered pathologic.

Data were collected into the periodontal chart designed according to Basle, modified by Gressly. Plaque was evaluated using the Plaque Index (PI) of Silness and Løe, whereas gingival status was evaluated using the Gingival index (GI) of Silness and Løe. Individual radiographs of the sites with the largest pocket depths, as well as panoramic radiographs, were used to establish a correct diagnosis.

Blood Lipid and Inflammatory Indices Analysis Plasma was obtained after centrifugation at 1500 g for 10 min and stored at -70°C until analysis. Cholesterol levels were measured using the enzymatic colorimetric method (510 nm). Normal values of this method are: 150 - 330 mg/dl. High-density lipoprotein (HDL) levels were measured by using the precipitation method. Normal values of this method are: 35 - 55 mg/dl. Low-density lipoprotein (LDL) levels were

measured by using the indirect method (Friedewald formula). Normal values of this method are:<6mg/L.

Statistical analysis: Parametric and non-parametric data were analysed using the Student-t test or Mann Whitney U-test, respectively.

RESULTS

The aim of this study was to compare the plasma levels of the established risk markers for atherosclerosis in patients with periodontal disease and healthy patients. The demographic analyses of the included patients were summarized in table 1. The comparison of the average level of HDL, LDL Cholesterol and CRP was done in between the periodontitis (Group A) and non periodontitis (Group B) patients respectively.

When the comparison of the cholesterol level was done between group A and group B, it was found that the cholesterol levels were found higher in the study group (Group A) as compared to the control group (Group B). The difference was found to be statistically significant. We found a strong significant positive correlation between cholesterol and probing depths and attachment loss.

When the comparison of the LDL level was done between group A and group B, it was found that the LDL levels were found higher in the study group (Group A) as compared to the control group (Group B). The difference was found to be statistically significant. We found a strong significant positive correlation between LDL and probing depths and attachment loss.

When the comparison of the HDL level was done between group A and group B, it was found that the HDL levels were found lower in the study group (Group A) as compared to the control group (Group B). The difference was found to be not significant We found a weak significant negative correlation between HDL and probing depths and attachment loss. Although plasma fibrinogen levels were higher in patients, the differences were not significant. CRP levels were found to be less than 6mg/l in both groups.

Table 1: demographic analysis of the included patients

| Demographic status | Group A | Group B |
|-----------------------|---------|---------|
| Gender (F/M) | 15/10 | 18/7 |
| Mean age | 54.96 | 38.65 |
| BMI | 28.3 | 22.8 |
| Mean no of teeth | 18 | 28 |
| Perio pocket | 20 | 0 |
| Mean depth of pockets | 5.18 | 0 |
| Attachment loss | 4.93 | 0 |

Table 2: The average levels of cholesterol, HDL, LDL, fibrinogen and CRP in periodontitis and non-periodontitis group

| Parameters | Group A | Group B |
|--------------------|---------|---------|
| LDL (mg/dl) | 182 | 115 |
| Fibrinogen (mg/dl) | 345 | 275 |

| | | |
|----------------------------|-------|-------|
| Cholesterol (mg/dl) | 248.5 | 185.8 |
| HDL (mg/dl) | 34 | 42 |
| CRP (mg/l) | < 6 | < 6 |

DISCUSSION

Benjamin Franklin's remark "An ounce of prevention is worth a pound of cure". Underlines the importance of prevention in terms of disease prevalence and its effect of causation into the physiologic functioning. Oral health is the most overlooked aspect of one's health contributing ill health. It is an essential and vital component of overall health and is associated with much more than just healthy teeth.¹²

The inflammation of periodontium is caused by bacteria, primarily by gram negative anaerobic bacteria (It may consist of Actinomyces species, P micros, P intermedia, P gingivalis and trepanoma species, etc.) The link between periodontal disease and cardiovascular health is strong, and it's clear that the two are intertwined. Researchers discovered that the bacteria causing disease can spread throughout the blood via blood stream producing inflammation in heart vessels and infection in heart valves.^{13,14}

A systemic bacterial or viral infection is frequently the cause of strokes. Thromboembolic events are the most common cause of stroke. Periodontitis was found to be a larger risk of stroke than smoking, regardless of any recognized risk factors. Poor dental health was found to be a significant risk factor for cerebrovascular ischemia in case control studies.^{15,16}

In agreement with other studies, we found significant differences in total cholesterol and LDL levels between periodontitis and non-periodontitis cases, which may account for the correlation between periodontal and cardiovascular diseases, to which high cholesterol and LDL levels are known risk factors.

CONCLUSIONS

In this study we have found serological differences of some parameters, known to be risk factors for atherosclerosis, between patients with periodontal disease and healthy patients.

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