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PERIODONTITIS AS A RISK FACTOR FOR SYSTEMIC DISEASES; A CASE CONTROL STUDY

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ABSTRACT

Introduction: Severe periodontitis has been associated with increased systemic inflammation. In contrary to previous thought that periodontitis is localized only to the marginal periodontium and that it rarely had systemic implications in healthy individuals, more recent evidence indicated that patients with periodontitis present with increased systemic inflammation, as indicated by raised serum levels of various inflammatory markers when compared with those in unaffected control populations, predisposing a person to metabolic syndrome which is a combination of risk factors that significantly contribute to the development of atherosclerosis, cardiovascular disease (CVD) and diabetes. **Aims and objectives:** To compare various systemic parameters like lipid and blood glucose levels in periodontitis patients compared to healthy controls. **Materials and methods:** 25 subjects with healthy periodontium (Group A) that is control group was compared to 25 subjects with chronic generalized periodontitis (Group B) that is patients for the systemic parameters that is lipid and blood glucose levels. Data was analysed by Paired t-test. A P-value of less than 0.05 was considered statistically significant. **Results:** In Group B a statistically significant increase in parameters was found as compared to Group A that is control group. **Conclusions:** To conclude, periodontitis is a risk factor for systemic diseases and if left uncontrolled and untreated would lead to actual disease process.

KEYWORDS: Periodontitis, inflammation, diabetes, cardiovascular disorders.

INTRODUCTION

There is a two-way association between periodontal infections and systemic disorders which has always remained a matter of interest to researchers. Gram-negative bacteria present on the tooth surface as bio films gain access to the gingival tissues, initiate and perpetuate inflammation, resulting in production of high levels of proinflammatory cytokines. Periodontitis is not merely a consequence of plaque accumulation but is also influenced by various host factors which alters the course on a particular individual. The factors include; ageing, smoking, oral hygiene, socioeconomic status, genetics, race, gender, psychosocial stress, osteopenia, osteoporosis, and other medical conditions including obesity and type 2 diabetes mellitus.[1,2]Primary facts that support the biological connection between periodontitis and systemic diseases are that both are infectious diseases, periodontal diseases cause transient and low-grade bacteraemia and endotoxemia,expression of virulence factors by periodontal pathogens, systemic immune responses and inflammation triggered by periodontal diseases and presence of periodontal pathogens in non oral tissues like athermatous plaques.[3,4] patients with periodontitis have increased systemic inflammation, as indicated by raised serum levels of various inflammatory markers such as elevated C-reactive protein (CRP),when compared with those in unaffected control populations.[5]Elevated levels of CRP has been directly associated with the onset and progression of cardiovascular diseases (CVD).[6] Monocyte-derived cytokines such as TNF α, IL-1β or interferon-γ produced in response to infection with gram-ve bacteria result in altered lipid metabolism, subsequent hyperlipidemia, insulin resistance and hence poor glyceamic control in periodontitis.[7] TNF-α is known to suppress insulin-induced tyrosine phosphorylation of insulin receptor substrate-1 (IRS-1), hence impaired insulin action[8] and elevation of fasting glucose levels.

The aim of present study is to measure fasting plasma lipids as well as blood glucose in non-diabetic periodontal diseased patients and control subjects.

METHADOLOGY

Subjects were assigned into two groups :- 25 subjects with healthy periodontium that is control group (Group 1) and 25 Subjects in chronic generalized periodontitis Group i.e patients (Group 2) with pocket depth 5-7mm.The criteria for inclusion in the study was subjects age between 40-60 years, at least 8 teeth should be present, pockets with depths ranging from 5-7mm in chronic generalised periodontitis and subjects should not have

received periodontal treatment for the past 6 months. The criterion for exclusion was any dental treatment during the past 6 months, diabetes mellitus or any other endocrine disease, myocardial infarction, smokers and subjects taking any drug for hypercholesterolemia. Only the subjects who gave written consent and fulfilled all the qualifying criteria were taken up for the study.

After fulfilment of inclusion criteria for the study, the metabolic parameters that are serum levels of lipids (Total cholesterol, low density lipoprotein cholesterol, high density lipoprotein cholesterol and triglycerides) and Fasting blood sugar (FBS) of all groups were recorded. Venous blood sample was taken after 12 hours of fasting from antecubital vein of each subject and measured by Biochemistry analyser - Erba Mamnheim CHEM 5-Plus V_2. Cut-off points were used according to the laboratory's recommendation:Total cholesterol.230 mg/dl, LDL-cholesterol.160 mg/dl, HDL-holesterol, 45 mg/dl, Triglycerides.200 mg/dl, Blood glucose. 120 mg/dl.[9]

RESULTS

Statistical software SPSS (version 20.0) and Graph pad Prim (version 5.00) were used to carry out the statistical analysis of data. Data was analyzed by means of descriptive statistics viz, means, standard deviations and percentages. Analysis of variance (ANOVA) test was employed for inter group analysis and for multiple comparisons least significant difference (LSD) test was used. A P-value of less than 0.05 was considered statistically significant. All P-values were two tailed. As shown in below mentioned table, a statistically significant difference is found in all the metabolic parameters which were checked in the study. Although only systemically healthy individuals were taken in the study, the values of all the metabolic parameters checked were more in group 2 that is patients with periodontitis compared to the control group that is patients with healthy periodontium except for high density lipoproteins which are higher in control group.

Table: Blood lipid and glucose levels (mg/dl; mean and standard deviation) in controls and periodontitis patients.

	Controls		Patients		
	Mean	**Sd**	**Mean**	**Sd**	***P*-Value**
Total cholesterol (mg/dl)	167	12.50	207.8	47.61	0.001*
LDL cholesterol (mg/dl)	116.3	9.04	142.5	10.43	<0.001*
HDL cholesterol (mg/dl)	35.3	2.97	27.1	2.34	<0.001*
Triglycerides (mg/dl)	124.7	20.97	172.5	26.17	<0.001*
Glucose (mg/dl)	85.3	6.43	114.3	15.77	<0.001*

DISCUSSION

There are various risk factors, such as diabetes mellitus, smoking, poor health care habits which are common to periodontitis and cardiovascular disease.[10] In periodontal diseases, anaerobic Gram negative oral bacterias are the primary cause of infections that lead to gingival inflammation, destruction of periodontal tissues, loss of alveolar bone, and eventual exfoliation of teeth in severe cases. Recent studies indicate that increased systemic inflammation as indicated by raised serum levels of various inflammatory markers, is present in patients with periodontitis which puts them at a higher risk for cardiovascular diseases. In the present study, compared to controls, subjects with periodontitis had higher plasma levels of total cholesterol, LDL cholesterol and triglycerides but low levels of high density lipoproteins(which are higher in control group)which is in accordance to the study conducted by Losche w et al[11] where also the patients with periodontitis had deranged lipid profiles as compared to controls. Monocyte-derived cytokines such as TNF α, IL-1β or interferon-γ produced in response to infection with gram-ve bacteria result in altered lipid metabolism, subsequent hyperlipidemia, insulin resistance and hence poor glyceamic control in periodontitis

Diabetes mellitus patients were excluded from our study still the values of fasting blood glucose levels in periodontitis patients were significantly higher than in controls. This observation may indicate that patients with periodontitis have some problems with their glycaemic control and are in a pre-diabetic condition. It has also been evidenced that severe periodontal disease may deteriorate glycaemic control[12] TNF-α is known to suppress insulin-induced tyrosine phosphorylation of insulin receptor substrate-1 (IRS-1), hence impaired insulin action and elevation of fasting glucose levels. The results of our study are again in accordance to the study conducted by Loschew w et al[11] where also the patients

with periodontitis had a significantly increased levels of fasting blood glucose as compared to controls.

Hence to conclude periodontitis is a risk factor for altered lipid and blood glucose levels in the periodontitis patients and if left uncontrolled may lead to actual hyper lipidemia which predisposes patients to atherosclerosis and increased blood glucose levels leading to actual diabetes.

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