

Original Research Article

Association of C- reactive protein level and lipid profile in periodontitis and ischemic heart disease in urban population of Malwa region

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ABSTRACT

Background: Various studies have explored the relationship between periodontal disease and ischemic heart disease but their result is diverse. This review article is designed to update the relationship among periodontal disease and ischemic heart disease. Hence, the aim of the present study was to assess whether there is a link between periodontal and ischemic heart disease (IHD).

Methods: This study includes 90 subjects, which were divided into 3 groups: 30 subjects -healthy individuals, 30 subjects- having Periodontitis, 30 subjects- suffering from ischemic heart diseases.

Results: The mean OHI-S scores for group 1, 2 and 3 were 0.95 ± 0.60 , 2.91 ± 0.90 , 1.54 ± 0.74 respectively. CRP level group 2 and 3 were significantly higher than group 1 ($p=0.002$ and 0.00 respectively) whereas difference between group 2 and 3 was not significantly significant. Lipid profiles, cholesterol, low density lipoprotein (LDL), triglycerides higher in group 2 as compare to 1 and 3. High density lipoprotein (HDL) levels between groups were not significantly different.

Conclusions: Based on findings and other reports Periodontitis could be a predisposing factor for IHD and perhaps there can be an association among both the diseases.

Keywords: C-reactive protein, Ischemic heart disease, Lipid metabolism, Periodontitis

INTRODUCTION

Inflammation referring to a defensive tissue response to injury has been involved in the pathogenesis of numerous diseases. It has got a vital role in complex multifactorial chronic inflammatory diseases including periodontitis and IHD.¹ Periodontitis is a chronic infectious/inflammatory disease of multifactorial etiology. In spite of the fact that it is started by dental plaque related microorganism, the inflammatory process is sustained by the host. Bacteria known to cause

periodontitis include *Aggregatibacter actinomycetemcomitans*, *Porphyromonas gingivalis*, *Tannerella forsythia*, *Treponoma denticloa*, *Fusobacterium nucleatum*, *Prevotella intermedia*, *Eikenella corrodens*, *Streptococcus intermedius*.

Atherosclerosis is a inflammatory process & plays a constant role in progression, destabilization and rupture of atheroma.² Ischemic heart disease (IHD) refers to a cluster of narrowly linked syndromes that is caused by an discrepancy among myocardial oxygen demand and

blood supply.³ The probable relation between oral and systemic disease dates back to 1900 when the idea of ‘oral sepsis’ was suggested by a British physician William Hunter subsequently in 1912. It was replaced by ‘focal infection’ by Frank Billings.⁴

Two main mechanisms of focal infection were projected: An actual metastasis of organisms from a focus and spread of toxins from a remote focus to other tissues by blood stream. Though this hypothesis was overlooked on different grounds.⁴ Over the last two decades the entire theory of focal infection has reappeared with the effort done who established an extremely important correlation among poor oral health and acute myocardial infarction.⁵

Of a variety of oral health diseases researchers have studied the association between Periodontitis and atherosclerotic cardiovascular diseases and have illuminated the basic biologic plausibility that exists between them. Reason for Periodontitis being concerned could be attributed to the information that there is a constant bacteremia that poses a regular microbial challenge for an extended period.⁵ Incidence of periodontitis is reported to be 20-50% in population globally. Earlier researches have determined the role of inflammation and its biomarkers in IHD. In this specific circumstance, chronic Periodontitis is one of the most prevalent infection. This has been observed, for instance in the raised CRP level which is a prognostic marker of cardiovascular risk.⁶

Nevertheless, these studies were not certain due to absence of uniformity in chronic periodontitis evaluation and the existence of other variables such as smoking. Hence, the relationship with chronic periodontitis and IHD remain uncertain. This study has not been carried out in Malwa region of Madhya Pradesh so we thought it appropriate to do this study in Malwa region of Madhya Pradesh, with the aim and objective to evaluate probable links between periodontitis and IHD by investigating CRP level, lipid metabolism in periodontitis and IHD patients.

METHODS

The study was conducted at Sri Aurobindo Institute of Medical Sciences from July 2018 to December 2018 & it included 90 subjects, according to the following,

Inclusion criteria

patients with periodontitis pocket depth (PD) ≥4 mm & patients with Ischemic heart disease verified by typical changes in the electrocardiogram and elevation of serum enzymes (creatinine phosphokinase (CPK), troponin levels) & 2D Echocardiography together with or without chest discomfort.

Exclusion criteria

Any known systemic disease other than Ischemic heart disease, smoking history, pregnancy, & who were on drugs like antibiotic or NSAID.

They were divided into group of 30 subjects. Group 1: healthy control, Group 2: patients diagnosed with Periodontitis, Group 3: patients suffering from IHD.

Participants were informed in detail about the planned study and written informed consents were obtained. An ethical clearance certificate from the institution’s ethical committee was obtained prior to the study. Participants were instructed to fast overnight. Armamentarium: mouth mirror, no.5 explorer (shepherd’s hook), William’s probe- to check pocket depth, CPITN probe.

To assess periodontal status, authors have used: OHI-S (oral hygiene index simplified); RUSSELL’S periodontal index; CPITN (community periodontal index of treatment needs). OHI-S was used to evaluate oral hygiene status. Clinically measurable periodontal disease was principle indicator of an oral infection- No of teeth examined are only six teeth. Only one surface of the selected tooth is examined.

A 4ml of venous blood sample was obtained from a vein in the cubital fossa using a 5ml disposable syringe and 23gauge needle. 2ml of blood sample without EDTA used to measure CRP and obtain lipid profile. CRP level: Blood sample were centrifuged at 1006.2×g for 5minutes. Serum was separated for CRP levels using a semi autonomic analyzer with CRP detection range >0.6mg/dl.

Characteristics of lipid metabolism: for the lipid profile, blood was allowed to clot, centrifuged at 1006.2×g for 20 minutes, then the serum was separated and stored at -400 °C. Serum cholesterol, triglycerides, high HDL and LDL were analyzed using COBAS integral 400 plus fully automated analyzer. All data analyzed statistically using independent t-test, p value ≤0.05 were considered significant.

RESULTS

The mean OHI-S scores for groups 1, 2 and 3 were 0.95±0.60, 2.91±0.90and 1.54±0.74, respectively.

Table 1: Comparisons of serum CRP (mg/dl) levels of groups.

Group	Mean±SD	p
1	0.8643±0.61342	0.002
2	2.769±0.93213	
1	0.8769±0.1234	0.000
3	3.8648±1.32065	
2	2.789±0.93214	0.153
3	3.6821±1.350974	

The mean percentage probing pocket depth for group 2 was 63.871±11.512. CRP levels of groups 2 and 3 were significantly higher than group 1 (p=0.002 and 0.000, respectively), whereas the difference between groups 2 and 3 was not statistically significant (Table 1).

Lipid profiles showed that cholesterol, TGL and LDL levels were significantly higher for group 2 compared to both groups 1 and 3. HDL levels between groups were not significantly different (Table 2).

Table 2: Comparison of lipid metabolism (mg/dl) among all groups.

Groups	Cholesterol	Triglycerides	HDL	LDL
1	158±26.3	109±28.81	45±7.2	79±21.2
2	207±27.6	44±45.7	46±8.2	102±25.8
	(p=0.001)	(p=0.017)	(p=0.64)	(p=0.041)
1	158±27.3	180±29.4	43±7.6	79±21.2
3	170±29.3	116±30.9	47±7.8	86±18.4
	(p=0.131)	(p=0.419)	(p=0.35)	(p=0.303)
2	209±28.8	144±46.9	50±8.7	102±25.8
3	172±29.5	116±32.4	51±7.6	86±18.4
	(p=0.017)	(p=0.034)	(p=0.61)	(p=0.025)

DISCUSSION

Periodontal disease has a relationship with IHD but the influence of periodontal infection/inflammation is unknown. Through this study authors found higher serum CRP level in group 2 and group 3 compared to control. The damage done by periodontitis in the epithelium contributes the passage of bacteria into the blood stream, producing brief bacteremia. Various periodontal organisms like streptococcus sanguis porphyromonas gingivalis, Actinomycetemcomitans can reach the circulatory system and contributes in disease such as rheumatic fever, bacterial endocarditis etc.

Anemia of chronic disease associated with periodontitis is not related to iron/vitamin deficiency, it is observed in cases of rheumatoid arthritis, fungal infection and neoplastic illness⁷⁻⁹ ACD that accompanies periodontitis can be attributed to depressed erythropoiesis by systemically circulating pro- inflammatory cytokines that result from local chronic inflammatory process.

CONCLUSION

Periodontitis constitutes an active lever for systemic subclinical inflammation enhancement and contributes to endothelial and vascular dysfunction. Some evidences suggest that periodontal pathogens could initiate and perpetuate Adenotonsillar Hypertrophy. Based on result and other report periodontitis may be a risk factor for IHD and may be possible that they may share common risk factor. Although etiological association between periodontitis and IHD is not supported by present evidence but future investigation should not be discouraged as these entities are highly prevalent in developed and developing countries.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Bullon P, Newman HN, Battino M. Obesity, diabetes mellitus, atherosclerosis and chronic periodontitis: a shared pathology via oxidative stress and mitochondrial dysfunction? *Periodontol.* 2014;64(1):139-53.
2. Luis-Delgado O ,Echevarría-García JJ ,Berini-Aytés L , Gay-Escoda Periodontitis as a risk factor in patients with ischemic heart disease.*Europe PMC* 01 Mar 2004;9(2):131-7, 125-31.
3. London GM. The clinical epidemiology of cardiovascular diseases in chronic kidney disease: cardiovascular disease in chronic renal failure: pathophysiologic aspects. *Seminars Dialysis.* 2003;16(2):85-94.
4. Anjanaa R, Suresha R. Periodontal infection, a risk for ischemic heart disease. *SRJM.* 2010;3:12-9.
5. Mattila KJ, Nieminen MS, Valtonen VV, Rasi VP, Kesäniemi YA, Syrjälä SL, et al. Association between dental health and acute myocardial infarction *BMJ* 1989 Mar 25;298(6676):779-81.
6. Islam A, Rahman M, Ullah M, Yeasmin L. Link between periodontal disease and coronary artery disease. *Bangladesh Perspective.* 2014;7(10):44-54.
7. Sharma A, Astekar M, Metgud R, Soni A, Verma M, Patel S. A study of C-reactive protein, lipid metabolism and peripheral blood to identify a link between periodontitis and cardiovascular disease. *Biotechnic Histochemistr.* 2014;89(9):577-82.
8. Thompson GR, Soutar AK, Spengel FA, Jadhav A, Gavigan SJ, Myant NB. Defects of receptor-mediated low-density lipoprotein catabolism in homozygous familial hypercholesterolemia and hypothyroidism in vivo. *Proceedings National Academy Sci.* 1981;78(4):2591-5.

9. Rizos CV, Elisaf MS, Liberopoulos EN. Effects of thyroid dysfunction on lipid profile. *Open Cardiovascular Med J.* 2011;5:76.

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