

Correlation between C-Reactive Protein, Fibrinogen And Hypercholesterolemia In Healthy Periodontium And Chronic Periodontitis

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Abstract: The aim is to correlate the association between C-reactive protein, Plasma Fibrinogen and Hypercholesterolemia in patients with chronic periodontitis and healthy periodontium. This study shows that there is a distinct association between chronic periodontitis and cardiovascular disease.

Key Words: Chronic Periodontitis, CRP, HDL, Fibrinogen, CVD

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I. Introduction

Periodontal disease is a polymicrobial infectious disease that initiates and perpetuates inflammation, resulting in production of acute phase proteins like CRP and Fibrinogen and pro-inflammatory cytokines like Interleukin-1 and Interleukin-6, leading to primary destruction of periodontal ligament and secondary systemic dissemination of bacterial and inflammatory by-products. These pro-inflammatory cytokines also cause systemic dys regulation of lipid metabolism, which may play a significant role in the process of atherosclerosis enhancing the risk for developing Cardio-vascular disease².

C-reactive protein (CRP) was the first acute phase protein identified and thus is the best studied marker of inflammation in humans.⁹ This study is carried out to correlate the elevated level of Lipids, CRP and Plasma Fibrinogen in active periodontal disease and to prove that a risk factor for atherosclerosis with initiation of cardiovascular disease.

II. Aims And Objectives

1. To correlate the association between C-reactive protein, Plasma Fibrinogen and Hypercholesterolemia with Healthy Periodontium and Chronic Periodontitis.
2. Biochemical evaluation to assess the levels of C-reactive protein, Plasma Fibrinogen and Lipids in Chronic Periodontitis when compared to Healthy Individuals.

III. Materials And Methods

Fourty patients were selected from among those attending the Out patient Department of TamilNadu Government Dental College and Hospital, Chennai-3 after informed consent. Twenty patients who were periodontally normal, both clinically and radiographically with sound systemic health were taken as control group, while the other twenty patients who had clinical and radiographic evidence of Periodontitis but systemically healthy patients were selected for study group.

Criteria for control group and study group

Control group included periodontal sites which had a Probing Depth of ≤ 2 mm and which didn't bleed upon probing with attachment loss < 1 mm.

Study group included periodontal sites of > 4 mm Probing Depth and Clinical Attachment Level of > 3 mm which also bled upon probing.

Inclusion criteria

Both sexes, Age groups 35 – 55 years, Systemically healthy patients, Chronic periodontitis, ≥ 4 mm Probing Depth

Exclusion criteria

Smoking, Alcohol, Pregnancy, Acute Infections, Liver disease, Malignancy, Aspirin/any other drug intake, Hypertension Diabetes Bleeding disorder Cardio-Vascular Disease Gastro Intestinal disease

Patient consent

Patients were informed orally about the procedure and those agreed for the procedure participated in the study by signing the consent form.

Clinical examination

Examination was preceded thorough history of patients present dental and medical evaluation. Intra oral examination was carried out using mouth mirror, and Williams graduated periodontal probe. All patients underwent periodontal evaluation, hematological and biochemical analysis.

Periodontal Evaluation

1. Gingival Bleeding Index (Ainamo & Bay 1975)¹
2. Probing depth (PD)¹⁰
3. Clinical attachment level (CAL)¹⁰

Radiographic analysis

Intra oral periapical radiograph is taken at the sites which has maximum PD and CAL.

Hematological investigations: routine blood investigations done

Biochemical analysis

CRP, Lipid Profile (Fasting) (a) Total Cholesterol (b) Triglycerides (c) HDL Cholesterol (d) LDL Cholesterol (e) Ratio (Chol/HDL), Fibrinogen

IV. Statistical Analysis

The statistical package SPSS PC+ (Statistical Package for Social Sciences, Version 4.01) was used for statistical analysis. The mean values and the test of significance were obtained using Mann Whitney Test and Pearson Correlation Analysis.



Photograph 1 - Healthy Periodontium



Photograph 2 - Chronic Periodontitis

V. Results

Forty patients were selected from among those attending the Out patient Department of Tamil Nadu Government Dental College and Hospital, Chennai-3 were taken in the study and divided into two groups, control group (n=20) of systemically healthy patients without periodontitis and study group (n=20) of systemically healthy patients with chronic periodontitis.

Data's collected were analyzed statistically by Pearson Correlation Co-efficient analysis and Mann Whitney test.

Table 1 & 2, shows the mean values of Periodontal Clinical Parameters and Biochemical values in the control and the study group respectively and proportion of abnormality in control and study group.

Table 4, shows the statistical analysis by Pearson Correlation test for control and study group. There is a Correlation between PD and CAL for CRP in the study group which shows a high significance.

Table 5 (Figure 1, 2 & 3), shows the mean rank and values by Mann Whitney test which is highly significant ($P < 0.001^{**}$) in CRP, Fibrinogen and HDL.

VI. Tables

Table 1: Proportion of Abnormality in Control group and Study group

Biochemical Analysis	No. of patients with values decreased below normal		No. of patients with values increased above normal	
	Control group	Study group	Control group	Study group
Total Cholesterol	14	8	6	12
Triglycerides	17	14	3	6
HDL	5	16	15	4
LDL	14	10	6	10

Table 2: Pearson correlation co-efficient analysis for Clinical parameters and Biochemical parameters in Control group and Study group

Variables	PD		CAL	
	Control Group	Study Group	Control Group	Study Group
CRP	-0.022 P= 0.925	0.884 P= 0.001**	-0.268 P= 0.252	0.727 P= 0.001**
Fibrinogen	0.227 P= 0.335	0.476 P= 0.0340	-0.162 P= 0.493	0.301 P= 0.196
Total Cholesterol	0.004 P= 0.985	-0.338 P= 0.888	-0.176 P= 0.457	-0.185 P= 0.437
Triglycerides	-0.160 P= 0.501	0.079 P= 0.740	0.032 P= 0.893	-0.111 P= 0.639
HDL	-0.137 P= 0.570	-0.070 P= 0.766	-0.392 P= 0.087	-0.070 P= 0.361
LDL	-0.071 P= 0.765	-0.197 P= 0.405	-0.107 P= 0.652	-0.234 P= 0.319

Note ** Denotes Significance at 1% level

Table 3: Mean and P value for Clinical Parameters and Biochemical Parameters in control group and study group by Mann Whitney U test

Variables	Mean		P value
	Control Group	Study Group	
CRP	10.5	30.50	< 0.001**
Fibrinogen	10.5	30.5	< 0.001**
Total Cholesterol	17.33	23.67	< 0.085
Triglycerides	17.42	23.58	< 0.096
HDL	25.33	15.68	< 0.008**
LDL	18.55	22.45	< 0.301

Note ** Denotes Significance at 1% level

Fig.1 Mann Whitney Analysis of CRP in Control And Study Group

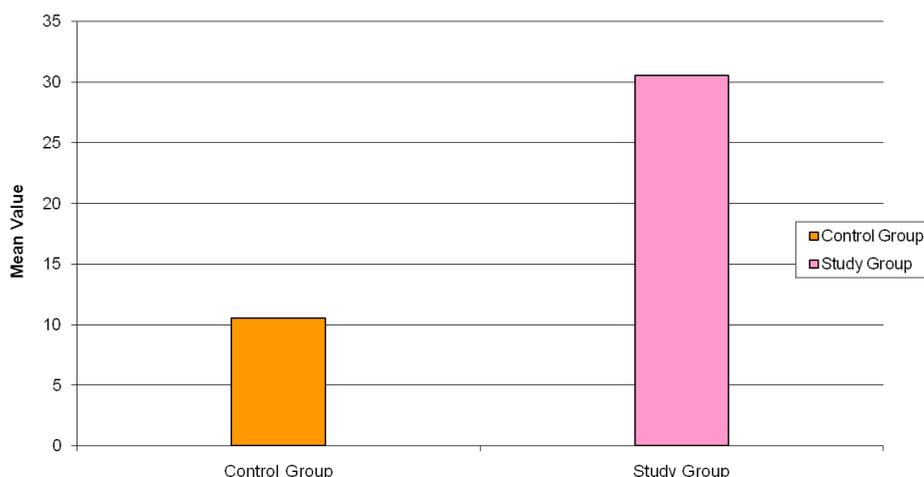
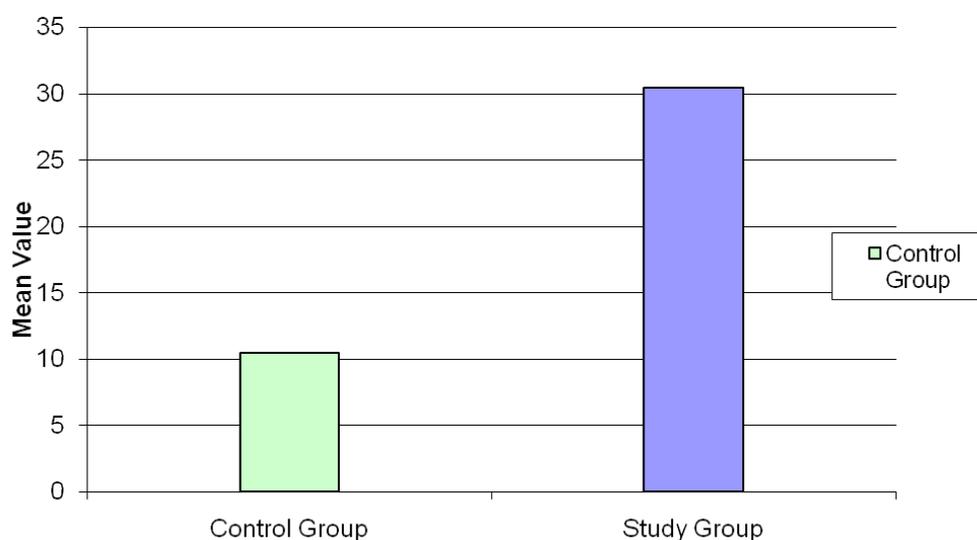
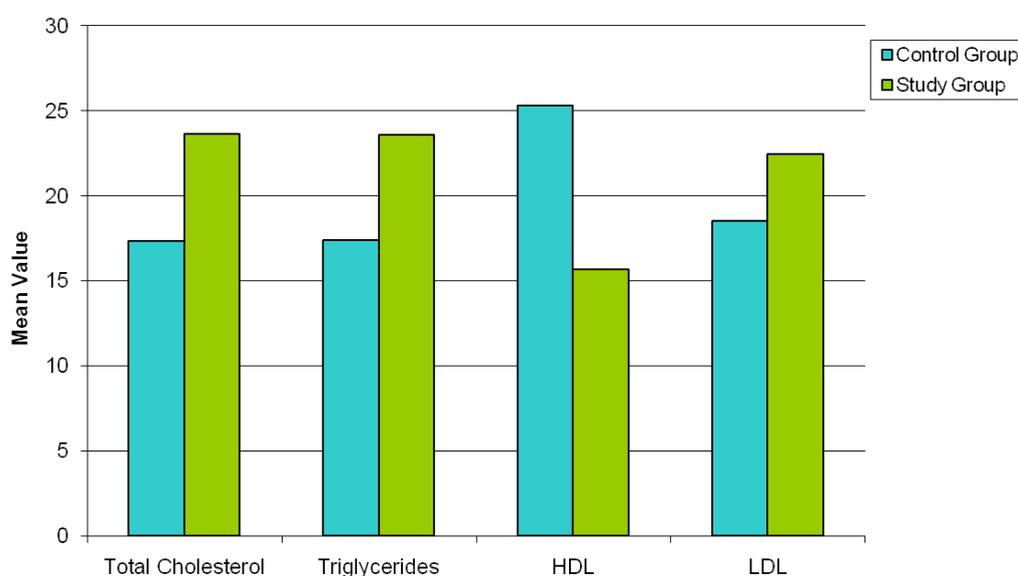


Fig. 2 Mann Whitney Analysis of Fibrinogen in Control And Study Group**Fig.3 Mann Whitney Analysis of Lipids in Control And Study Group**

VII. Discussion

The role played by the oral infections especially chronic periodontitis as foci for cardiovascular disease is gaining importance in the recent times⁵. Few studies have reported a positive increase between Periodontitis and CRP, Fibrinogen and Lipids, thus explaining the part played by periodontal disease and the importance of maintaining periodontal health in association with cardiac health.

The prevalence of cardiovascular disease has recently shown an alarming increase in incidence and reality. Incidence and prevalence studies^{3, 8} have reported that a lot of variables play a role in the etiopathology of cardiovascular disease like age, habits like smoking, alcohol³, diet³, stress, occupational stress, diabetes mellitus, and hypercholesterolemia⁶.

The other confounding factors related to elevated CRP, Fibrinogen and Lipids include habits like smoking and alcohol, pregnancy, acute infections anywhere in the body, malignancy, hypertension, diabetes mellitus, bleeding disorder are eliminated in the present study as in the earlier studies⁷. In the present study routine blood investigations have been done to eliminate bleeding disorders, anemia and acute infections.

From this study it is inferred that chronic periodontitis is one of the risk factor for cardiovascular disease. The patients with cardiovascular disease should also be subjected to periodontal screening⁷.

VIII. Summary And Conclusion

Forty patients attending the Out Patient Department of Tamil Nadu Govt Dental College, Chennai-3 were taken in the study and divided in two groups Control group (n=20) and Study group (n=20). Control group included systemically healthy patients with periodontal sites which had a Probing Depth of ≤ 2 mm and clinically healthy gingiva with no bleeding on probing and < 1 mm attachment loss present. Study group included systemically healthy patients with periodontal probing depth > 4 mm and loss of attachment > 3 mm which also bleed upon probing. Parameters PD and CAL were used to assess the disease activity. 5 ml of venous blood drawn from anticubital vein was collected and sent to laboratory for biochemical analysis after centrifuging. Data's obtained were analyzed statistically by using Mann-Whitney U test and Pearson correlation test. **The results showed that values of CRP, Fibrinogen and HDL Cholesterol were statistically significant in Study group than the Control group.**

Further studies are to be done focusing an increase in sample size using more periodontal variables in different systemic inflammatory disease conditions to establish the fact that there is a relationship between Hypercholesterolemia, Fibrinogen and CRP in healthy periodontium and chronic periodontitis.

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