

Assessment to Levels of C Reactive Proteins in Patients with Generalised Periodontitis

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ABSTRACT

Background: CRP is a pentameric plasma protein with homologs in vertebrates and many invertebrates that participate in the systemic response to inflammation. The relation between vascular events and periodontal disease is further supported by evidence showing that oral bacteria can cause platelet aggregation and thromboembolic events by upregulating the expression of platelet aggregation-associated protein. **Aim of the study:** To assess levels of c reactive proteins in patients with generalised periodontitis.

Materials and methods: The study was conducted in the Department of Periodontology of the Dental institution. For the study, we selected patients who were referred to the Department of Periodontology for specialized treatment. The inclusion criteria were lack of systemic disease, not taking antibiotics from past one month, no intraoral lesions, and not who have not undergone any periodontal procedure for 6 months. A total of 30 subjects with generalized periodontitis and 30 control healthy patients were selected. The subjects were categorized based on gingival index, clinical attachment loss indices into 3 equal groups of healthy, plaque-induced gingivitis and chronic periodontitis.

Results: A total of 25 patients were enrolled in each group, Periodontitis group and Control group. The mean age of patients in periodontitis group was 36.21 years and in control group was 37.54 years. Number of male subjects in periodontitis group was 14 and in control subjects was 12. Mean CRP level in periodontitis group was 3258.87 pg/mL and in control group was 5458.87 pg/mL. The results were compared and were found to be statistical non-significant.

Conclusion: From the results of present study, we conclude that there is correlation between salivary CRP levels and severity of periodontal disease and the measurement of CRP level can be used for the diagnosis of periodontitis.

Keywords: CRP, Periodontitis, gingival index.

INTRODUCTION

CRP is a pentameric plasma protein with homologs in vertebrates and many invertebrates that participate in the systemic response to inflammation. It is a pattern recognition molecule, that is extremely sensitive and non-specific acute-phase marker for inflammation, produced in response to many forms of injury other than binding to specific molecular configurations that are

typically exposed during cell death or found on the surfaces of pathogens. It is regulated by cytokines like interleukin-6 (IL-6), interleukin-1 β (IL-1 β) and tumour necrosis factor- α (TNF- α).^{2,3} The relation between vascular events and periodontal disease is further supported by evidence showing that oral bacteria can cause platelet aggregation and thromboembolic events by upregulating the expression of platelet aggregation-associated protein.⁴ It is also known that CRP induces

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monocytes/macrophages to produce tissue factors, which stimulate the coagulation pathway and increase blood coagulability. Hence, CRP levels in the gingival crevicular fluid may be a new way to assess cardiovascular disease risk due to periodontitis.^{5, 6} Hence, the present study was conducted to assess levels of c reactive proteins in patients with generalised periodontitis.

MATERIALS AND METHODS

The study was conducted in the Department of Periodontology of the Dental institution. The ethical clearance for study protocol was obtained from ethical committee of the institution. For the study, we selected patients who were referred to the Department of Periodontology for specialized treatment. The inclusion criteria were lack of systemic disease, not taking antibiotics from past one month, no intraoral lesions, and not who have not undergone any periodontal procedure for 6 months. A total of 25 subjects with generalized periodontitis and 25 control healthy patients were selected. The subjects were categorized based on gingival index, clinical attachment loss indices into 3 equal groups of healthy, plaque-induced gingivitis and chronic periodontitis. For the analysis of saliva CRP level, unstimulated saliva sample was collected using spitting method for each subject. Patients were restricted from eating or drinking for 2 hours before collecting samples. After collection of samples, salivary CRP level was evaluated in the laboratory.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

RESULTS

Table 1 shows the demographic details of the participants. A total of 25 patients were enrolled in each group, Periodontitis group and Control group. The mean age of patients in periodontitis group was 36.21 years and in control group was 37.54 years. Number of male subjects in periodontitis group was 14 and in control subjects was 12. Table 2 shows mean concentration of CRP in both groups. Mean CRP level in periodontitis group was 3258.87 pg/mL and in control group was 5458.87 pg/mL.

The results were compared and were found to be statistical non-significant. (Fig 1)

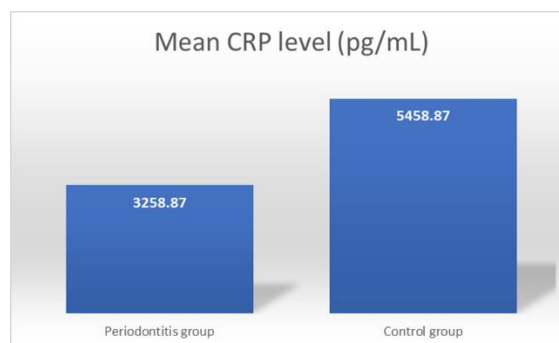
Table 1: Demographic details of participants.

Variables	Periodontitis group	Control group
Mean age (years)	36.21	37.54
Number of patients	25	25
Number of male subjects	14	12
Number of female subjects	11	13

Table 2: Mean concentration of CRP in both groups.

Group	Mean CRP level (pg/mL)	p-value
Periodontitis group	3258.87	0.78
Control group	5458.87	0.21

Fig 1: Mean concentration of CRP in both groups.



DISCUSSION

In the present study, we observed that mean CRP level was increased in periodontitis group. The results were found to be statistical non-significant. The results were compared with previous studies. Bolla V et al evaluated and compared serum C-reactive protein (CRP) levels in subjects with chronic and aggressive periodontitis. Based on the periodontal status, 45 subjects were selected and divided into three groups. Group I – subjects with clinically healthy periodontium, Group II – generalized aggressive periodontitis (GAP), and Group III – chronic periodontitis (CP). Blood

samples were collected from subjects for measurement of CRP. Periodontal parameters include plaque index (PI), gingival index, bleeding index (BI), probing pocket depth (PPD), and clinical attachment loss (CAL) were assessed. CRP levels were assessed by means of a commercially available high sensitivity-CRP enzyme immunoassay kit. CRP levels were increased in Group III (6.0671 ± 3.15639 mg/L) and Group II subjects (4.5453 ± 2.88116 mg/L) compared to the Group I (1.0180 ± 0.94069 mg/L). CRP levels showed a positive correlation with all clinical parameters in Group I subjects. BI ($r = 0.073$), PI ($r = 0.120$) showed a positive correlation with CRP level in Group II and a positive correlation was also seen for PI ($r = 0.492$), PPD ($r = 0.340$), CAL ($r = 0.160$), and CRP level in Group III subjects. They concluded that the mean CRP levels were found to be greater in CP compared to GAP subjects, but there was no statistically significant difference. Podzimek S et al compared and evaluated the systemic levels of CRP in the peripheral blood samples of patients with chronic and aggressive periodontitis, gingivitis, and gingival recessions and compare them with periodontal clinical parameters. All patients ($N = 158$) were examined prior to the initiation of periodontal treatment. Patients were divided into four groups. Group A consisted of 26 patients with aggressive periodontitis, Group B consisted of 111 patients with chronic periodontitis, Group C consisted of 13 patients with gingivitis, and Group D consisted of 8 patients with gingival recessions. Our study results indicate that CRP levels increase subsequently with the severity of the periodontal disease and that the bleeding on probing index showed much better positive correlation with the CRP levels compared to the pocket depth index in both periodontitis patients groups, especially in aggressive periodontitis patients.^{7,8}

Goyal L et al determined and compared the relative levels of serum CRP in aggressive and chronic periodontitis patients. A total of 75 systemically healthy subjects were divided into three groups: Group I, nonperiodontitis subjects; group II, chronic generalized periodontitis patients and group III, generalized aggressive periodontitis patients. All participants were subjected to quantitative CRP analysis using enzyme-linked immunosorbent assay. Mean CRP levels were significantly greater in both group II and III as compared to group I and

group III having greater level than group II. Furthermore, CRP levels positively correlated with the amount of periodontal destruction as measured by probing depth and clinical attachment loss. The results indicates a positive correlation between CRP and periodontal disease severity with particular concern in younger individuals that could be a possible underlying pathway in the association between periodontal disease and the observed higher risk for cardiovascular disease in periodontitis patients. Shojaee M et al compared the amount of salivary C-Reactive protein (CRP) in healthy subjects and patients with periodontal disease. This case-control study was done on 90 patients referred to the Department of Periodontology of Babol Dentistry School. These subjects were divided into three groups of healthy ($n = 30$), gingivitis ($n = 30$), and chronic periodontitis ($n = 30$), based on Gingival Index (GI) and Clinical Attachment Loss (CAL) indices. 2ml saliva samples were collected from these people and clinical indicators including GI, CAL, Periodontal Pocket Depth (PPD), and Bleeding Index (BI) were assessed. ELISA method was used to evaluate the salivary CRP levels. Collected data were analyzed using SPSS statistical software by non-Parametric Kruskal-Wallis and Mann-Whitney test and Spearman correlation coefficient and $P < 0.05$ was considered significant. The mean salivary CRP levels were 5332.62 ± 5051.63 pg/ml in periodontitis patients, 3545.41 ± 3061.38 pg/ml in gingivitis group and 3108.51 ± 3574.47 pg/ml in healthy subjects. The statistic analysis showed a significant difference in salivary CRP concentrations between the periodontitis patients and healthy subjects. The results indicate that there is a significant association between periodontitis and salivary CRP concentrations.^{9,10}

CONCLUSION

From the results of present study, we conclude that there is correlation between salivary CRP levels and severity of periodontal disease and the measurement of CRP level can be used for the diagnosis of periodontitis.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

REFERENCES

1. Black S, Kushner I, Samols D. C-reactive Protein. *J Biol Chem.* 2004;279:48487–90.
2. Ebersole JL, Cappelli D. Acute-phase reactants in infections and inflammatory diseases. *Periodontol.* 2000;23:19–49.
3. Bennett JC, Plum F. The acute phase response. *Cecil textbook of Medicine Edition 20th.* Saunders. Philadelphia. 1996;2:1535–37.
4. Iwamoto Y, Nishimura F, Soga Y, Takeuchi K, Kurihara M, Takashiba S, et al. Antimicrobial periodontal treatment decreases serum C-reactive protein, tumor necrosis factor-alpha, but not adiponectin levels in patients with chronic periodontitis. *J Periodontol.* 2003;74:1231–6.
5. Polson AM, Goodson JM. Periodontal diagnosis. Current status and future needs. *J Periodontol.* 1985;56:25–34.
6. Joshipura KJ, Rimm EB, Douglass CW, Trichopoulos D, Ascherio A, Willett WC. Poor oral health and coronary heart disease. *J Dent Res.* 1996;75:1631–6.
7. Bolla V, Kumari PS, Munnangi SR, Kumar DS, Durgabai Y, Koppolu P. Evaluation of Serum C-reactive Protein Levels in Subjects with Aggressive and Chronic Periodontitis in Comparison with Healthy Controls: A Clinico-biochemical Study. *Int J Appl Basic Med Res.* 2017;7(2):121–124. doi:10.4103/2229-516X.205814
8. Podzimek S, Mysak J, Janatova T, Duskova J. C-Reactive Protein in Peripheral Blood of Patients with Chronic and Aggressive Periodontitis, Gingivitis, and Gingival Recessions. *Mediators Inflamm.* 2015;2015:564858. doi:10.1155/2015/564858
9. Goyal L, Bey A, Gupta ND, Sharma VK. Comparative evaluation of serum C-reactive protein levels in chronic and aggressive periodontitis patients and association with periodontal disease severity. *Contemp Clin Dent.* 2014;5(4):484–488. doi:10.4103/0976-237X.142816
10. Shojaee M, Fereydooni Golpasha M, Maliji G, Bijani A, Aghajanzpour Mir SM, Mousavi Kani SN. C - reactive protein levels in patients with periodontal disease and normal subjects. *Int J Mol Cell Med.* 2013;2(3):151–155.