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ORIGINAL RESEARCH

Assessment of CRP levels in periodontitis patients

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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. 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. There is strong evidence that CRP is increased in otherwise healthy adults with poor periodontal status. **Aim of the study:** To assess CRP levels in periodontitis patients. **Materials and methods:** The present study was conducted in the Department of Periodontics of the Dental institution. For the study, we selected patients with periodontitis referred to the department of periodontology. A total of 90 subjects with generalized periodontitis and 90 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. **Results:** A total of 90 patients were enrolled in each group, Periodontitis group and Control group. The mean age of patients in periodontitis group was 45.69 years and in control group was 43.58 years. Mean CRP level in periodontitis group was 4925.31 pg/mL and in control group was 3285.24 pg/mL. The results were compared and were found to be statistically significant. **Conclusion**: Within the limitations of the present study, it can be concluded that there is statistically significant association of mean CRP level and periodontitis. The level of CRP increases with the severity of periodontitis.
Keywords: Periodontitis, CRP level, Periodontal health

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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. [1] It is regulated by cytokines like interleukin-6 (IL- 6), interleukin-1β (IL-1β) and tumour necrosis factor-α (TNF-α). [2, 3] These in turn cause systemic changes including hepatic release of a range of plasma proteins, activation of complement proteins and various metabolic changes. According to the Centers for Disease Control and Prevention/American Heart Association, CRP levels >3 mg/L indicates a higher risk for CVDs, whereas CRP levels of 1-3 mg/L suggests medium risk, and CRP levels <1 mg/L suggests lower risk. [4] A number of studies have demonstrated an association between periodontal disease and the risk of CVD.[5] CRP possess the ability to predict future cardiovascular events in apparently healthy individuals. But, it is not clear whether this association is casual or definite as both the diseases share so many risk factors. There is strong evidence that CRP is increased in otherwise healthy adults with poor periodontal status. However, the disparity among them occurs in terms of methods used, criteria of patient

selection, confounding of risk factors and moreover some authors denied this association.[6] Hence, the present study was conducted to assess CRP levels in periodontitis patients.

MATERIALS AND METHODS

The present study was conducted in the Department of Periodontics of the Dental institution. The ethical clearance for the study was approved from the ethical committee of the hospital. For the study, we selected patients with periodontitis referred to the department of periodontology. 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 90 subjects with generalized periodontitis and 90 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 statistically significant.

RESULTS

Table 1 shows the demographic details of periodontitis group and control group. A total of 90 patients were enrolled in each group, Periodontitis group and Control group. The mean age of patients in periodontitis group was 45.69 years and in control group was 43.58 years. Number of male subjects in periodontitis group was 49 and in control subjects was 46. Table 2 shows mean concentration of CRP in both groups. Mean CRP level in periodontitis group was 4925.31 pg/mL and in control group was 3285.24 pg/mL. The results were compared and were found to be statistically significant.

DISCUSSION

In the present study, we studied CRP level in a total of 90 patients with periodontitis. For the study, we had two groups of patients with 90 patients in each group, Periodontitis group and control group. Mean CRP level in control group was 3285.24 pg/mL and in periodontitis group was 4925.31 pg/mL. The results on comparison were found to be statistically significant. The results were compared with previous studies from the literature and were found to be consistent with the results. Kumar S et al[7] studied the effect of periodontal treatment on the CRP levels of gingival crevicular fluid and determined the effect of nonsurgical therapy in minimizing the CRP levels in chronic generalized periodontitis. Gingival crevicular fluid was collected using a micro capillary pipette that was hand calibrated at every 1 mm till 10 mm, from selected sites in the subjects on the 1st, 14th and 45th days. Decreased CRP levels of gingival crevicular fluid were observed at the end of the study.

There was a 37% reduction in probing pocket depth and 45% gain in clinical attachment level and a reduction of about 57% after 14 days and 90% reduction of CRP levels in gingival crevicular fluid after 45 days. The results showed that the presence of CRP level is more significant in gingival crevicular fluid and confirms the underlying inflammatory component of the disease activity in chronic periodontitis.

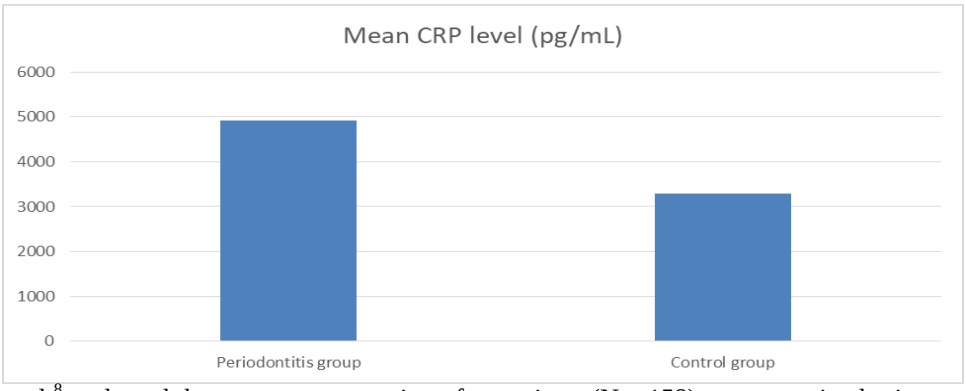
Table 1: Demographic details of Periodontitis group and control group

Variables	Periodontitis group	Control group
Mean age (years)	45.69	43.58
Number of patients	90	90
Number of male subjects	49	46
Number of female subjects	41	44

Table 2: Mean concentration of CRP in both groups

Group	Mean CRP level (pg/mL)	p-value
Periodontitis group	4925.31	0.002
Control group	3285.24	

Figure 1: C reactive proteins



Kanaparthy A et al [8] evaluated the serum concentration of CRPs, which can be used as a marker of periodontal disease as well as a risk indicator for cardiovascular diseases. A total number of 45 subjects were selected from the outpatient department of periodontics a mean age of 40 years. Based on the periodontal status, the subjects were divided into 3 groups of 15 subjects each. Group I: Control group [with attachment loss (AL) ≤ 2 mm and pocket depth (PD) < 3 mm], Group II: Generalized aggressive periodontitis (AL ≤ 5 mm), Group III: chronic periodontitis (AL ≥ 2 mm, PD ≥ 5 mm), which includes moderate and severe periodontitis. The clinical parameters recorded were plaque index, gingival index, bleeding index, probing PD, and clinical attachment levels and scoring was done on 6 surfaces of all teeth. Overall, the mean CRP levels were high in subjects with generalized aggressive and chronic periodontitis compared with controls. This was found to be statistically significant. A statistically significant difference was found in the CRP level between groups I and II and between groups II and III, and between groups I and III. They concluded that an increase in serum CRP levels in subjects with generalized aggressive periodontitis and chronic periodontitis as compared with the controls.

Jayaprakash D et al [9] evaluated the effect of periodontal therapy on GCF CRP levels in patients with gingivitis and chronic periodontitis. A total of 60 subjects were included in the study with 20 subjects each in following groups: I-Healthy, II-Gingivitis, III-Mild periodontitis based on community periodontal index scores. Periodontal therapy was performed on Group II and Group III patients. GCF was collected from each subject at baseline and 3 months after periodontal therapy. They report that the periodontitis group had a higher mean CRP level (2.49 ± 0.47 ng/ml) when compared with the Gingivitis group (1.40 ± 0.32 ng/ml) and Healthy group (0.56 ± 0.20 ng/ml). The mean CRP values after periodontal therapy were found to be reduced to 0.44 ± 0.23 ng/ml in Group II and 1.30 ± 0.36 ng/ml in Group III patients. They concluded that GCF CRP level progressively increases from periodontal health to disease. It can also be stated that there is a decrease in GCF CRP levels with periodontal treatment. Podzimek S et al [10] 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. Their study results indicated 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. Shojaee M et al [11] studied the amount of salivary C-Reactive protein (CRP) in healthy subjects and patients with periodontal disease. This 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. The mean salivary CRP levels were 5332.62±5051.63pg/ml in periodontitis patients, 3545.41±3061.38pg/ml in gingivitis group and 3108.51±3574.47pg/ml in healthy subjects. The statistic analysis showed a significant difference in salivary CRP concentrations between the periodontitis patients and healthy subjects. They concluded that there is a significant association between periodontitis and salivary CRP concentrations.

CONCLUSION

Within the limitations of the present study, it can be concluded that there is statistically significant association of mean CRP level and periodontitis. The level of CRP increases with the severity of periodontitis.

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