

Original Research

Evaluation of C- reactive proteins levels in periodontitis patients

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ABSTRACT:

Background: To evaluate C- reactive protein levels in periodontitis. **Materials & methods:** A total of 40 systemically healthy subjects were divided into two groups: Group I, nonperiodontitis subjects and group II, chronic generalized periodontitis patients. Gingival index was calculated. The results were analysed using SPSS software. The p – value less than 0.05 was considered significant. **Results:** The mean CRP (mg/L) levels for both groups were 0.99 and 2.40, respectively. CRP values of the two groups were significantly different from each other, with CRP levels in the group II greater than those in the group I subjects. **Conclusion:** Increase in serum CRP levels in subjects with generalized periodontitis

Keywords: CRP, Plaque index, Periodontitis.

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INTRODUCTION

Periodontitis is a local inflammatory process mediating destruction of periodontal tissues triggered by bacterial insults. ¹ Periodontal subgingival pathogens affect local and systemic immune and inflammatory response. Local inflammatory response to these gram-negative bacteria and bacterial products is characterized by the infiltration of periodontal tissues of the inflammatory cells, including polymorphonuclear leucocytes, macrophages, lymphocytes, and plasma cells. Activated macrophages release cytokines and some individuals respond to microbial challenge with an abnormally high delivery of such mediators as PGE₂, IL-1, and TNF- α . ² Periodontitis is defined as the inflammatory disease of supporting tissues of the teeth caused by specific microorganisms or groups of specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with pocket formation, recession or both. ³ The pathogenic role of the subgingival microbiota in the initiation and progression of periodontitis is widely accepted. Periodontal pathogens affect local and systemic immune and inflammatory responses. The local inflammatory response to these bacteria or bacterial

products is characterized by infiltration of the periodontal tissues by inflammatory cells including polymorphonuclear neutrophils (PMNs), macrophages, lymphocytes and plasma cells. ¹ Activated macrophages release cytokines and some individuals respond to microbial challenge with an abnormally high delivery of such inflammatory mediators as PGE₂, IL-1 and TNF. These cytokines are involved in the destruction of both the periodontal connective tissue and alveolar bone.^{2,4} Serum CRP (C- reactive protein) concentration rises rapidly in the acute-phase response and can exceed 300 mg/l by 48 h after a severe stimulus, such as myocardial infarction, acute systemic bacterial infection, major trauma, or surgery. Until recently, CRP values < 10 mg/L were considered normal, while acute bacterial infections have been reported in 80% to 85% of patients with CRP values >100 mg/L. However CRP values previously considered as high normal have been reported to be predictive of atherosclerotic complications. ⁵ A positive association between CRP and destructive periodontal disease was found in an analysis of third National Health and Nutrition Examination survey (NHANES III),

providing a potential mechanism to link destructive periodontal disease with an increased risk of atherosclerotic complications.⁶ Hence, this study was conducted to evaluate C- reactive protein levels in periodontitis.

Materials & methods

A total of 40 systemically healthy subjects were divided into two groups: Group I, nonperiodontitis subjects and group II, chronic generalized periodontitis patients. Gingival index was calculated. Samples were centrifuged in the centrifuge machine at 3000 rpm for 10 min to separate the serum from blood. All participants were subjected to quantitative CRP analysis using enzyme-linked immunosorbent assay. The results were analysed using SPSS software. The p – value less than 0.05 was considered significant.

Results

A total of 40 subjects were included. The two groups showed plaque index with score in group I as 0.62 and in group II was 2.35. The mean CRP (mg/L) levels for both groups were 0.99 and 2.40, respectively. CRP values of the two groups were significantly different from each other, with CRP levels in the group II greater than those in the group I subjects.

Table 1: clinical parameters and serum CRP levels

Groups	PI	GI	CAL (mm)	CRP (mg/dL)
Group I	0.62	0.54	0.68	0.99
Group II	2.35	2.08	4.19	2.40

GI : Gingival index, PI: plaque index, CAL: clinical attachment loss

Discussion

Periodontitis is an inflammatory disease of the supporting tissues surrounding the teeth. Earlier it was considered simply as a chronic localized infection; however, a growing body of evidence suggests that the pathology of periodontitis may affect the outcome of several systemic diseases, such as myocardial infarction, stroke, or preterm low birth weight babies.⁷ Gram-negative anaerobes present in large numbers in subgingival dental plaque in periodontal pockets affect the local and systemic inflammatory response. Endotoxins derived from gram-negative microorganisms interact with toll-like receptors expressed on the surface of neutrophils, macrophages, lymphocytes, and plasma cell, which are abundant in periodontal inflammation. Toll-like receptors-ligand complexes activate single transduction pathways in both the innate and adaptive immune systems leading to the production of cytokines, which coordinate the local and systemic inflammatory responses. Some individuals respond to microbial challenge with an abnormally high delivery of such inflammatory mediators as PGE-2, IL-1, and TNF.^{2,8,9} Hence, this

study was conducted to evaluate C- reactive protein levels in periodontitis.

In the present study, a total of 40 subjects were included. The two groups showed plaque index with score in group I as 0.62 and in group II was 2.35. The mean CRP (mg/L) levels for both groups were 0.99 and 2.40, respectively. A study by Kanaparthi A et al, 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) \leq 2 mm and pocket depth (PD) $<$ 3 mm], Group II: Generalized aggressive periodontitis (AL \leq 5 mm), Group III: chronic periodontitis (AL \geq 2 mm, PD \geq 5 mm), which includes moderate and severe periodontitis. 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 (P = 0.012) was found in the CRP level between groups I and II and between groups II and III, and between groups I and III.¹⁰

In the present study, CRP values of the two groups were significantly different from each other, with CRP levels in the group II greater than those in the group I subjects. Another study by Goyal L et al, 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. 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.¹¹ Gupta S et al, sample consisted of 45 individuals of age group 30-60 years that was divided into two groups Group I (control) and Group II (patients with chronic generalized periodontitis). The clinical parameters such as plaque index, calculus index, gingival index, probing pocket depth, clinical attachment level, and serum hs-CRP levels were recorded for these individuals. The patients with healthy gingiva possessed a mean hs-CRP level of 0.252 ± 0.0393 which was lower as compared to the patients with chronic periodontitis. In periodontitis patients mean levels of hs-CRP was 0.106 ± 0.029 which reduced to 0.044 ± 0.027 after periodontal therapy. A significantly elevated CRP level was found in subjects with periodontitis compared to the controls. The serum levels of C-reactive protein were

elevated in patients with periodontitis and this might be a diagnostic marker for cardiovascular diseases.¹² In a very early study conducted by Boucher et al.,¹³ it was apparent from the results that CRP appears in the serum of patients with some forms of inflammatory oral disease. This study was one of the earliest studies to determine a relationship between the levels of CRP and oral diseases. In the present days, the levels of CRP have been correlated with many systemic conditions such as AMI, angina, diabetes mellitus, malignancies etc.

Recent evidence has indicated that patients with severe periodontitis have increased serum levels of CRP, when compared with control population.¹⁴ But they fall short in indicating that periodontitis was the cause for the observed serum CRP levels as CRP levels fluctuate with various confounding factors like aging, high blood pressure, alcohol, smoking, low levels of physical activity, chronic fatigue, estrogen, high protein diet, sleep disturbances and depression.¹⁵

Conclusion

Increase in serum CRP levels in subjects with generalized periodontitis.

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