

Association of C-Reactive Protein and Periodontitis**Manpreet Kaur**

Department of Periodontics, Post Graduate Institute of Dental Sciences, Rohtak, Haryana, India.

Address for Correspondence:

Dr. Manpreet Kaur, Department of Periodontics, Post Graduate Institute of Dental Sciences, Rohtak, Haryana, India.

ABSTRACT:

C-Reactive protein (CRP) is an inflammatory marker produced by liver. It has importance in innate immunity. In presence of inflammation, there is increase in levels of CRP. In periodontitis, there is inflammation of the supporting tissues of the teeth and loss of bone and periodontal ligament. In periodontitis, there is ulceration in the sulcular epithelium of periodontal pocket. Pathogenic bacteria enters into circulation through ulcerated pocket. Increase in inflammatory markers such as interleukin 1, tumor necrosis factor 1α also occurs with periodontitis. It is postulated that increase in bacteria in circulation or rise in cytokines may be responsible for systemic inflammation in periodontitis. In this review, association of periodontitis and CRP is discussed.

Key words: Bacteria; C-Reactive Protein; Periodontitis.

INTRODUCTION

C-Reactive protein (CRP) is a sensitive and non-specific acute-phase marker for inflammation¹. Tissue injury, infectious agents, inflammation, hypoxia lead to increase in CRP¹. CRP levels are higher in smokers, obese individuals, individuals with abnormal fibrinolytic activity and subclinical atherosclerosis². CRP levels provide useful information for the diagnosis, monitoring, and therapy of the inflammatory process and associated disease^{3,4}.

CRP levels rise in serum or plasma within 24 to 48 hours following acute tissue damage, reach a peak during the acute stage (as high as a thousand-fold), and decrease with the resolution of inflammation or trauma⁴. CRP has role in the innate immune response and is easily measured due to its long plasma half-life (12 to 18 hours)⁵. In healthy individuals, CRP levels are found in trace amounts with levels $<0.3\text{mg/L}$ ⁶. Detection of CRP levels $\geq 0.9\text{ mg/L}$ is also possible through hypersensitive immunonephelometry and is the method of choice for determining serum CRP concentrations⁷.

BIOLOGIC PLAUSIBILITY FOR ASSOCIATION BETWEEN CRP AND PERIODONTITIS:

It is biologically plausible that inflammatory mediators, such as IL-1 and -6 and TNF- α are increased in periodontitis and have capacity to stimulate hepatocytes to produce CRP⁸. So due to this it is expected that periodontitis patients have higher serum CRP levels⁹.

ASSOCIATION OF CRP WITH PERIODONTITIS:

CRP is associated with periodontitis¹⁰. In chronic periodontitis⁸ and aggressive periodontitis¹¹ patients, mean CRP levels were higher than those in the group without periodontitis. Elevated CRP levels are associated with periodontal infection with subgingival organisms such as *P.gingivalis*, *P.intermedia* and *C.rectus*¹². Presence of periodontal pockets¹⁰, severe attachment loss⁹ and alveolar bone loss¹³ is associated with elevated levels of CRP. Elevated serum immunoglobulin IgG to *P. gingivalis* is positively correlated to hsCRP¹⁴. CRP is involved with endothelial cell damage, endothelial adhesion molecule expression, leukocyte invasion into subendothelial tissue,

vascular wall inflammation, and plaque instability¹⁵. According to American Heart Association, CRP levels >3 mg/L indicate a high risk of cardiovascular diseases (CVD), whereas CRP levels of 1 to 3 mg/L suggest a medium risk, and CRP levels <1mg/L suggest low risk¹⁶. As elevated CRP plasma levels is a risk factor for CVD, positive correlation between CRP and periodontal disease might be a possible underlying pathway in the association between periodontal disease and the observed higher risk for CVD in these patients¹². Treatment of chronic periodontitis is associated with decrease in levels of CRP¹⁷. However, studies reported that achievement of periodontal health does not lead to decrease in CRP levels¹⁸. Periodontitis is reported to be associated with increased CRP levels in pregnancy¹⁹. This increase in CRP levels could potentially be responsible for association of periodontitis with adverse pregnancy outcomes¹⁹.

CONCLUSION

CRP, an inflammatory marker elevates in cardiovascular disease, diabetes, rheumatic arthritis. Increased levels of CRP is also associated with periodontitis. As periodontal disease is linked to various diseases such as cardiovascular diseases and diabetes, CRP seems to be responsible for mediating link between them. Association between adverse pregnancy outcomes such as low birth weight preterm labour and periodontitis may be due to increased CRP in pregnancy. This review thus indicates the importance of association of CRP and periodontitis and its possible role in increasing propensity for other diseases.

REFERENCES:

1. Glurich I, Grossi S, Albin B, et al. Systemic inflammation in cardiovascular and periodontal disease: Comparative study. *Clin Diagn Lab Immunol* 2002;9:425-32.
2. Ridker PM, Silvertown JD. Inflammation, C-reactive protein, and atherothrombosis. *J Periodontol* 2008;79:1544-51.

3. Dixon JS, Bird HA, Sitton NG, Pickup ME, Wright V. C-reactive protein in the serial assessment of disease activity in rheumatoid arthritis. *Scand J Rheumatol* 1984;13:39-44.
4. Kushner I. C-reactive protein in rheumatology. *Arthritis Rheum* 1991;34:1065-8.
5. Ridker PM. Clinical application of C-reactive protein for cardiovascular disease detection and prevention. *Circulation* 2003;107:363-9.
6. Macy EM, Hayes TE, Tracy RP. Variability in the measurement of C-reactive protein in healthy subjects: Implications for reference intervals and epidemiological applications. *Clin Chem* 1997;43:52-8.
7. Ridker PM. C-reactive protein and the prediction of cardiovascular events among those at intermediate risk: Moving an inflammatory hypothesis toward consensus. *J Am Coll Cardiol* 2007;49:2129-38.
8. Gomes-Filho IS, Freitas Coelho JM, da Cruz SS, Passos JS, Teixeira de Freitas CO, Aragão Farias NS, Amorim da Silva R, Silva Pereira MN, Lima TL, Barreto ML. Chronic periodontitis and C-reactive protein levels. *J Periodontol* 2011;82:969-78.
9. Persson GR, Pettersson T, Ohlsson O, Renvert S. High-sensitivity serum C-reactive protein levels in subjects with or without myocardial infarction or periodontitis. *J Clin Periodontol* 2005;32:219-24.
10. Slade GD, Offenbacher S, Beck JD, Heiss G, Pankow JS. Acute-phase inflammatory response to periodontal disease in the US population. *J Dent Res* 2000;79: 49-57.
11. Salzberg TN, Overstreet BT, Rogers JD, Califano JV, Best AM, Schenkein HA. C-reactive protein levels in patients with aggressive periodontitis. *J Periodontol* 2006;77:933-9.
12. Noack B, Genco RJ, Trevisan M, Grossi S, Zambon JJ, De Nardin E. Periodontal infections contribute to elevated systemic C-reactive protein level. *J Periodontol* 2001;72:1221-7.
13. Saito T, Murakami M, Shimazaki Y, Oobayashi K, Matsumoto S, Koga T.

Association between alveolar bone loss and elevated serum C-reactive protein in Japanese men. *J Periodontol* 2003;74:1741-6.

14. Craig RG, Yip JK, So MK, Boylan RJ, Socransky SS, Haffajee AD. Relationship of destructive periodontal disease to the acute-phase response. *J Periodontol* 2003;74:1007-16.

15. Slade GD, Ghezzi EM, Heiss G, Beck JD, Riche E, Offenbacher S. Relationship between periodontal disease and C-reactive protein among adults in the Atherosclerosis Risk in Communities study. *Arch Intern Med* 2003;163:1172-9.

16. Pearson TA, Mensah GA, Alexander RW, et al. Markers of inflammation and cardiovascular disease: Application to clinical and public health practice: A statement for healthcare professionals from the Centers for Disease Control and Prevention and the American Heart Association. *Circulation* 2003;107:499-511.

17. Shimada Y, Komatsu Y, Ikezawa-Suzuki I, Tai H, Sugita N, Yoshie H. The effect of periodontal treatment on serum leptin, interleukin-6, and C-reactive protein. *J Periodontol* 2010;81:1118-23.

18. Ide M, McPartlin D, Coward PY, Crook M, Lumb P, Wilson RF. Effect treatment of chronic periodontitis on level of serum markers of acute-phase inflammatory and vascular responses. *J Clin Periodontol* 2003;30: 334-40.

19. Pitiphat W, Joshipura KJ, Rich-Edwards JW, Williams PL, Douglass CW, Gillman MW. Periodontitis and plasma C-reactive protein during pregnancy. *J Periodontol* 2006;77:821-5.

How to cite this article: Manpreet Kaur. Association of C-Reactive Protein and Periodontitis. *Arch of Dent and Med Res* 2018;4(1):13-15.