Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies *NLM ID: 101716117*

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Indian Citation Index (ICI) Index Copernicus value = 100

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Evaluation of CRP levels among patients undergoing non-surgical periodontal therapy

[1]Siri Chandana Gonabhavi, [2]Sunil Kumar Biraggari, [3]Venkatasailakshmi Swathi Koutha, [4]Pranay Raj Kandagatla

[1,2]MDS, Periodontics and Implantology, G.Pulla Reddy Dental College and Hospital, Kurnool, Andhra Pradesh, India;
[3,4]BDS, Sibar Institute of Dental Sciences, Guntur, Andhra Pradesh, India

ABSTRACT:
Background: Periodontal disease is traditionally defined by the gradual deterioration of both the soft and hard tissues associated with the periodontal complex. C-reactive protein (CRP) is a pentameric plasma protein that has homologs in both vertebrates and numerous invertebrates. Hence; the present study was conducted for evaluating CRP levels among patients undergoing non-surgical periodontal therapy. **Materials & methods:** A total of 50 patients with presence of advanced periodontitis were enrolled. Complete demographic and clinical details of all the patients was obtained. Diagnosis of advanced periodontitis was confirmed Clinical Periodontal Sum Score (CPSS) and was based on clinical and periodontal examination. All the patients were recalled in the morning and blood samples were obtained. Non-surgical periodontal therapy was carried out in all the patients. All the patients were recalled on follow-up after one month of non-surgical periodontal therapy. CRP levels was measured by using auto-analyzer. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis suing SPSS software. **Results:** Mean CRP levels at baseline was found to be 2.49 ng/ml. After one month of non-surgical periodontal therapy, mean CRP levels were found to be 1.12 ng/ml. While comparing the mean CRP levels at baseline and after one month of non-surgical periodontal therapy, non-significant results were obtained. **Conclusion:** C-reactive protein (CRP), owing to its opsonizing properties, is significant in the innate immune response. It can be posited that CRP may serve as a potential biomarker for periodontal disease.
Key words: C Reactive proteins, periodontal therapy.

Received: 22 October, 2024 Accepted: 25 November, 2024

Corresponding author: Siri Chandana Gonabhavi, MDS, Periodontics and Implantology, G.Pulla Reddy Dental College and Hospital, Kurnool, Andhra Pradesh, India

This article may be cited as: Gonabhavi SC, Biraggari SK, Koutha VS, Kandagatla PR. Evaluation of CRP levels among patients undergoing non-surgical periodontal therapy. J Adv Med Dent Scie Res 2024; 12(12):79-82.

INTRODUCTION

Periodontal disease is traditionally defined by the gradual deterioration of both the soft and hard tissues associated with the periodontal complex. This process is driven by a complex interaction between dysbiotic microbial populations and dysfunctional immune responses occurring within the gingival and periodontal tissues.[1,2] As the normal oral microbiota shifts towards a dysbiotic state, potential periodontal pathogens become more prevalent, leading to inflammatory responses that result in tissue damage. This creates a continuous cycle characterized by proteolysis, inflammation, and further proliferation of periodontal pathogens. The presence of key microbial pathogens and ongoing gingival inflammation play essential roles in the advancement of periodontal disease.[3,4]

C-reactive protein (CRP) is a pentameric plasma protein that has homologs in both vertebrates and numerous invertebrates, playing a crucial role in the systemic inflammatory response. As a pattern recognition molecule, CRP serves as a highly sensitive and non-specific acute-phase marker for inflammation, synthesized in reaction to various types of injury, rather than solely binding to specific molecular structures typically associated with cell death or present on pathogen surfaces.[4,5] The levels of CRP are correlated with factors such as smoking, obesity, triglyceride levels, diabetes, and periodontal disease. It is suggested that alterations in the cellular

and molecular constituents of peripheral blood may be observed in individuals with periodontitis, attributable to the inflammatory changes occurring in the periodontal tissues.[6] Hence; the present study was conducted for evaluating CRP levels among patients undergoing non-surgical periodontal therapy.

MATERIALS & METHODS

The present study was conducted for evaluating CRP levels among patients undergoing non-surgical periodontal therapy. A total of 50 patients with presence of advanced periodontitis were enrolled. Complete demographic and clinical details of all the patients was obtained. Diagnosis of advanced periodontitis was confirmed Clinical Periodontal Sum Score (CPSS) and was based on clinical and periodontal examination. All the patients were recalled in the morning and blood samples were obtained. Non-surgical periodontal therapy was carried out in all the patients. All the patients were recalled on follow-up after one month of non-surgical periodontal therapy. CRP levels was measured by using auto-analyzer. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis suing SPSS software. Student t test was used for evaluation of level of significance.

RESULTS

Mean age of the patients was 46.5 years. 60 percent of the patients belonged to more than 40 years of age. 70 percent of the patients were males and 66 percent of the patients were of urban residence. Mean CRP levels at baseline was found to be 2.49 ng/ml. After one month of non-surgical periodontal therapy, mean CRP levels were found to be 1.12 ng/ml. While comparing the mean CRP levels at baseline and after one month of non-surgical periodontal therapy, non-significant results were obtained.

Table 1: Demographic data

Demographic details	Number	Percentage
Mean age (years)	46.5	
Age group > 40 years	30	60
Age group ≤ 40 years	20	40
Males	35	70
Females	15	40
Rural residence	17	34
Urban residence	33	66

Table 2: Comparison of CRP levels

Time period	Mean	SD	p-value
Baseline	2.49	1.23	0.001 (Significant)
After one month of non-surgical periodontal therapy	1.12	0.85	

DISCUSSION

Periodontal diseases are widespread in both developed and developing nations, impacting approximately 20-50% of the global population. The significant prevalence of these diseases among adolescents, adults, and the elderly underscores their status as a public health issue. Various risk factors, including smoking, inadequate oral hygiene, diabetes, certain medications, age, genetic predisposition, and stress, are associated with the onset of periodontal diseases. Substantial evidence indicates a correlation between periodontal diseases and systemic health issues, such as cardiovascular disease, diabetes and negative pregnancy outcomes. Specifically, periodontal disease is associated with a 19% increase in the risk of developing cardiovascular disease, with this relative risk escalating to 44% in individuals aged 65 and older. Furthermore, individuals with severe periodontal disease who have type 2 diabetes face a mortality risk that is 3.2 times higher than that of those with no or mild periodontitis.[6-8]

C-reactive protein (CRP) is a serum protein produced exclusively by the liver in response to inflammatory conditions, typically existing in plasma at minimal concentrations. The synthesis and release of CRP escalate within 12 hours following an acute injury or the initiation of inflammation, with peak concentrations occurring between 24 to 48 hours. Once the inflammatory response subsides, CRP levels revert to baseline. Consequently, the measurement of CRP levels serves as a valuable tool for diagnosing, monitoring, and managing inflammatory processes and related diseases.[8- 10] Hence; the present study was conducted for evaluating CRP levels among patients undergoing non-surgical periodontal therapy.

Mean age of the patients was 46.5 years. 60 percent of the patients belonged to more than 40 years of age. 70 percent of the patients were males and 66 percent of the patients were of urban residence. Mean CRP levels at baseline was found to be 2.49 ng/ml. After one month of non-surgical periodontal therapy, mean CRP levels were found to be 1.12 ng/ml. While comparing the mean CRP levels at baseline and after one month of non-surgical periodontal therapy, non-significant results were obtained. Shah B et al conducted a study to assess the impact of scaling and root planing (SRP) on plasma levels of C-reactive protein (CRP). The research involved 30 patients diagnosed with advanced periodontitis, as indicated by their Clinical Periodontal Sum Score (CPSS).

Blood samples were collected from participants to obtain serum at both baseline and one month following the SRP procedure. High-sensitivity CRP (hs-CRP) levels were quantified using a highly sensitive immunoturbidimetric assay. The findings revealed a statistically significant decrease in CPSS values after SRP compared to baseline measurements. Likewise, there was a notable reduction in hs-CRP levels post-SRP relative to baseline levels. Additionally, a positive correlation was observed between the baseline CPSS and hs-CRP levels and their respective post-SRP values. The results of this study indicate that SRP can effectively lower CRP levels.[11] The findings presented by Salberz et al have substantiated a significant association between aggressive periodontitis and increased levels of C-reactive protein (CRP). Specifically, the group diagnosed with generalized aggressive periodontitis exhibited a markedly higher mean CRP level of 3.72 mg/l, in contrast to the localized aggressive periodontitis group, which had a mean level of 2.57 mg/l, and the non-periodontitis group, which recorded a mean level of 1.54 mg/l.[12] Musalaiah SV et al investigated the efficacy of nonsurgical periodontal therapy on red blood cell (RBC) parameters and hs-CRP in chronic periodontitis patients with anemia. The results showed that there was a significant increase in Hb levels, RBC count and PCV from baseline to 6 months after nonsurgical periodontal therapy. There is significant decrease in levels of ESR and hs-CRP levels after nonsurgical periodontal therapy indicating resolution of periodontal inflammation. There is a significant decrease in PPD, scores of PI and GI and significant increase in CAL gain. Minimal changes in mean corpuscular volume, mean corpuscular hemoglobin (MCH) and MCH concentration indicated that the lower values of red cell parameters are not due to any vitamin and mineral deficiencies, but secondary to the chronic inflammatory changes associated with chronic periodontal disease.[13] de Souza AB et al evaluated serum C-reactive protein (CRP) levels in chronic periodontitis patients and periodontally healthy individuals and to assess the effect of non-surgical periodontal treatment on the CRP levels. Twenty-two patients with chronic periodontitis (test group) and 22 periodontally healthy individuals (control group), both groups without any systemic disorder or potential confounding factors. The baseline CRP level in the test group was significantly higher than the corresponding value in the control group. After periodontal treatment in the test group, there were improvements in all periodontal clinical variables. The CRP level decreased significantly in those patients with higher baseline levels of CRP. Chronic periodontitis seemed to promote elevated levels of CRP. Furthermore, non-surgical periodontal treatment significantly decreased the levels of CRP only in patients with high baseline levels of such pro-inflammatory cytokine.[14-16]

CONCLUSION

C-reactive protein (CRP), a crucial component of the innate immune response, exhibits opsonizing properties that facilitate the clearance of pathogens and damaged cells. Its significance in the innate immune response underscores its potential as a biomarker for various inflammatory conditions, including periodontal disease.

Periodontal disease, a chronic inflammatory condition, is characterized by an aberrant immune response to dental plaque biofilm, leading to the destruction of periodontal tissues. Elevated CRP levels have been observed in patients with periodontal disease, suggesting a positive correlation between CRP and disease activity. Furthermore, CRP's ability to bind to phosphocholine on bacterial surfaces and facilitate their clearance implies its potential role in monitoring disease progression and treatment response. Therefore, CRP may serve as a valuable biomarker for periodontal disease, enabling early diagnosis and targeted therapeutic interventions.

REFERENCES

1. Abeles S. R., Robles-Sikisaka R., Ly M., Lum A. G., Salzman J., Boehm T. K., et al. Human Oral Viruses Are Personal, Persistent and Gender-Consistent. ISME. J. 2014; 8, 1753–1767.
2. Abusleme L., Dupuy A. K., Dutzan N., Silva N., Burleson J. A., Strausbaugh L. D., et al. The Subgingival Microbiome in Health and Periodontitis and Its Relationship With Community Biomass and Inflammation. ISME. J. 2013; 7, 1016–1025.
3. Kobayashi T., Yokoyama T., Ishida K., Abe A., Yamamoto K., Yoshie H. Serum Cytokine and Periodontal Profiles in Relation to Disease Activity of Rheumatoid Arthritis in Japanese Adults. J. Periodontol. 2010; 81, 650–657.
4. Kravitz MS, Shoenfeld Y. Autoimmunity to protective molecules: is it theperpetuum mobile (vicious cycle) of autoimmune rheumatic diseases. Nat ClinPractRheumatol. 2006;2:481–90.
5. Radafshar G, Shad B, Ariamajd E, Geranmayeh S. Tehran University of Medical Sciences. 1. l7. Tehran, Iran: 2010. Effect of intensive non-surgical treatment on the level of serum inflammatory markers in advanced periodontitis Journal of Dentistry; pp. 24–30.
6. Yamamoto T, Tsuneishi M, Furuta M, Ekuni D, Morita M, Hirata Y. Relationship between decrease of erythrocyte count and progression of periodontal disease in a rural Japanese population. J Periodontol. 2011;82:106–13.
7. Correa FO, Gonçalves D, Figueredo CM, Bastos AS, Gustafsson A, Orrico SR. Effect of periodontal treatment on metabolic control, systemic inflammation and cytokines in patients with type 2 diabetes. J ClinPeriodontol. 2010;37:53–8.
8. Thakare KS, Deo V, Bhongade ML. Evaluation of the C-reactive protein serum levels in periodontitis patients with or without atherosclerosis. Indian J Dent Res. 2010;21:326–9.
9. Gomes-Filho IS, Coelho JMF, Cruz SS, Passos JS, Freitas COT, Farias NSA, et al. Chronic periodontitis and C-reactive protein levels. J Periodontol. 2011;82:969–78.

10. Lopez R, Baelum V, Hedegaard CJ, Bendtzen K. Serum levels of C-reactive protein in adolescents with periodontitis. J Periodontol. 2011;82:543–49.
11. Shah B, Shah M, Geisinger M, Saleh MHA, Meghil M, Wang HL. Effect of non-surgical therapy on plasma C-reactive protein levels in patients with periodontitis: A single arm prospective clinical trial. J Periodontol. 2023 Mar;94(3):336-343
12. Salzberg TN, Overstreet BT, Rogers JD, Califano JV, Best AM, Schenkein HA. C-reactive protein levels in patients with aggressive periodontitis. J Periodontol. 2006;77:933–39
13. Musalaiah SV, Anupama M, Nagasree M, Krishna ChM, Kumar A, Kumar PM. Evaluation of nonsurgical periodontal therapy in chronic periodontitis patients with anemia by estimating hematological parameters and high-sensitivity C-reactive protein levels. J Pharm Bioallied Sci. 2014 Jul;6(Suppl 1):S64-9.
14. de Souza AB, Okawa RT, Silva CO, Araújo MG. Short-term changes on C-reactive protein (CRP) levels after non-surgical periodontal treatment in systemically healthy individuals. Clin Oral Investig. 2017 Jan;21(1):477-484.
15. Singh HP, Kumar P, Goel R, Kumar A. Sex hormones in head and neck cancer: Current knowledge and perspectives. Clin Cancer Investig J 2012;1:2-5.
16. Singh HP, Shetty DC, Kumar A, Chavan R, Shori DD, Mali J. A molecular insight into the role of inflammation in the behavior and pathogenesis of odontogenic cysts. Ann Med Health Sci Res 2013;3:523-8.