

Original Research

Assessment of C reactive proteins levels in patients with dental implant failure

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Abstract

Aim: To assess the levels of C-reactive protein (CRP) in patients with dental implant failure.

Materials and methods: The present study aimed to assess C-reactive protein (CRP) levels in patients experiencing dental implant failure. A total of 50 patients scheduled for prosthetic rehabilitation of missing molars were enrolled. Baseline hematological and biochemical parameters were recorded. All dental implant procedures were performed under strict aseptic conditions, and postoperative antibiotic therapy was prescribed for all patients. Radiographic evaluation was conducted after three months to assess prognosis. CRP levels were measured in all patients and compared based on their prognosis. Data analysis was done using SPSS software.

Results: A total of 50 patients, comprising 24 males (48%) and 26 females (52%) were included. Regarding age distribution, 20 patients (40%) were under 40 years old, while 30 patients (60%) were above 40 years old. The comparison of C-reactive protein (CRP) levels between successful dental implants and implant failure cases revealed a significant difference. The mean CRP level in patients with successful dental implants was 0.27 ± 0.16 mg/dL, whereas in those with implant failure, it was notably higher at 0.62 ± 0.21 mg/dL. This difference was statistically significant, with a P-value of 0.003.

Conclusion: Higher CRP levels were significantly linked to dental implant failure, indicating their potential as a biomarker for implant prognosis.

Keywords: Implants, protein, inflammatory

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Introduction

Implant success and survival rates of up to 100% have been reported. However, despite their predictable success, a small percentage of implants experience complications and failures. Peri-implant disease, a chronic inflammatory condition caused by bacterial plaque contamination, is a leading cause of implant failure. It is categorized into peri-implant mucositis, a reversible inflammation confined to the soft tissue, and peri-implantitis, a progressive inflammatory response resulting in alveolar bone loss. Clinical signs of peri-implantitis resemble those of chronic periodontitis and include bleeding on probing (BOP), soft-tissue inflammation, increased probing depth (PD), pain, and suppuration. While bacterial plaque is

the primary etiological factor, microbial virulence factors such as lipopolysaccharides exacerbate the inflammatory response through cytokines released by host immune cells.^{1,2}

C-reactive protein (CRP) is an acute-phase reactant known to induce the expression of cellular adhesion molecules, facilitating leukocyte adhesion to the vascular endothelium. It is associated with endothelial cell damage and serves as a marker of low-grade vascular inflammation. Elevated CRP levels have gained attention as they are now recognized as a risk factor for cardiovascular events when exceeding 2.1 mg/L.^{3,4}

Peri-implant disease is a chronic inflammatory condition caused by bacterial plaque contamination. C

reactive protein (CRP) is considered an acute-phase reactant and was shown to induce the expression of cellular adhesion molecules, thus mediating the adhesion of leukocytes to the vascular endothelium.^{5,6}

Hence the study aimed to assess the levels of C-reactive protein (CRP) in patients with dental implant failure.

Materials and methods

The present study aimed to assess C-reactive protein (CRP) levels in patients experiencing dental implant failure. A total of 50 patients scheduled for prosthetic

rehabilitation of missing molars were enrolled. Baseline hematological and biochemical parameters were recorded. All dental implant procedures were performed under strict aseptic conditions, and postoperative antibiotic therapy was prescribed for all patients. Radiographic evaluation was conducted after three months to assess prognosis. CRP levels were measured in all patients and compared based on their prognosis. Data analysis was done using SSPS software.

Results

Table 1: Demographic data

GENDER	
Male	24(48%)
Female	26(52%)
AGE GROUP	
Less than 40	20(40%)
Above 40	30(60%)

The study included a total of 50 patients, comprising 24 males (48%) and 26 females (52%). Regarding age distribution, 20 patients (40%) were under 40 years old, while 30 patients (60%) were above 40 years old.

Table 2: Comparison of C Reactive proteins levels

C Reactive proteins levels (mg/dL)	Successful dental implant	Dental implant failure	P value
Mean	0.62	0.27	0.003 significant
SD	0.21	0.16	

The comparison of C-reactive protein (CRP) levels between successful dental implants and implant failure cases revealed a significant difference. The mean CRP level in patients with successful dental implants was 0.27 ± 0.16 mg/dL, whereas in those with implant failure, it was notably higher at 0.62 ± 0.21 mg/dL. This difference was statistically significant, with a P-value of 0.003.

Discussion

Dental implants have revolutionized modern dentistry, offering a reliable solution for the replacement of missing teeth. However, implant failure remains a significant concern, often attributed to factors such as infection, poor osseointegration, and peri-implantitis. Inflammatory biomarkers, particularly C-reactive protein (CRP), play a crucial role in assessing systemic and local inflammatory responses. CRP is an acute-phase protein produced by the liver in response to infection, tissue injury, and chronic inflammation. Elevated CRP levels have been associated with various inflammatory conditions, including periodontal disease and implant-related complications. This study aims to assess CRP levels in patients with dental implant failure, evaluating its potential as a biomarker for predicting implant failure and understanding its role in peri-implant inflammation.^{7,8} In our study a total of 50 patients, comprising 24 males (48%) and 26 females (52%) were included.

Regarding age distribution, 20 patients (40%) were under 40 years old, while 30 patients (60%) were above 40 years old. The comparison of C-reactive protein (CRP) levels between successful dental implants and implant failure cases revealed a significant difference. The mean CRP level in patients with successful dental implants was 0.27 ± 0.16 mg/dL, whereas in those with implant failure, it was notably higher at 0.62 ± 0.21 mg/dL. This difference was statistically significant, with a P-value of 0.003.

In a study conducted by Kour P et al.⁹, C-reactive protein (CRP) levels were assessed in patients with peri-implantitis. A total of 120 patients were enrolled and divided into two groups, with 60 patients in each: Group A included peri-implantitis patients, while Group B comprised healthy controls. Complete demographic details were recorded for all participants. The mean CRP levels were found to be 401.8 pg/ml in Group A and 198.4 pg/ml in Group B. Statistical analysis revealed that CRP levels were significantly higher in peri-implantitis patients compared to healthy controls. The findings suggested that elevated CRP levels played a role in the pathogenesis of peri-implantitis.

Ganjoo D et al.¹⁰ aimed to assess C-reactive protein (CRP) levels in patients with dental implant failure. A total of 100 patients scheduled for prosthetic rehabilitation of missing mandibular molars were enrolled. The results showed that the mean CRP levels

were 0.89 mg/dL in patients with implant failure and 0.21 mg/dL in those with successful implants. Statistical analysis revealed a significant difference between the two groups, indicating that elevated CRP levels were associated with implant failure. The study concluded that CRP could serve as a reliable biomarker for monitoring the success of dental implant therapy.

Another study conducted by Kulkarni S et al.¹¹ aimed to evaluate C-reactive protein (CRP) levels in patients with active peri-implantitis. A total of 40 patients were included and divided into two groups: Group 1 consisted of 20 patients diagnosed with peri-implantitis based on clinical and radiographic evidence, while Group 2 included 20 healthy individuals with no signs of peri-implantitis, serving as the control group. Gingival crevicular fluid (GCF) samples were collected from all patients and analyzed for CRP levels. The results showed that the mean CRP level in the peri-implantitis group was 402.6 pg/ml, whereas the control group had a mean CRP level of 190.4 pg/ml, with standard deviations of 57.6 pg/ml and 29.1 pg/ml, respectively. Statistical analysis revealed a significant difference between the two groups, with a P-value of 0.01, indicating that CRP levels were markedly higher in peri-implantitis patients. The study concluded that elevated CRP levels in the GCF of peri-implantitis patients could be a significant indicator of disease presence and severity.

Although the study demonstrated a significant association between elevated CRP levels and peri-implantitis, the relatively small sample size may have influenced the results. A limited number of participants can reduce the statistical power of the study and may not fully represent the broader population. Larger-scale studies with more diverse patient groups are needed to validate these findings and establish CRP as a reliable biomarker for peri-implant disease.

Conclusion

Higher CRP levels were significantly linked to dental implant failure, indicating their potential as a biomarker for implant prognosis.

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