

## ORIGINAL ARTICLE

## MILD CHRONIC PERIODONTITIS: A POSSIBLE THREAT TOWARDS CVD IN MALES WITH RAISED C-RP

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**Background:** Chronic Periodontitis, is a globally common oral problem. Lately, the association between periodontitis and cardiovascular disease has received greater attention, though there is paucity of database in local population. The objective of this study was to explore the possible association of chronic periodontitis with cardiovascular disease by elevating C-reactive proteins (C-RP), and to study any influence of gender, in the study population. **Methods:** This was an analytical cross-sectional study and involved 75 patients (46 males and 29 females) volunteering their blood samples, out of which 55% carried both cardiac and periodontal diseases, whereas 45% had periodontitis alone. Serum level of C-RP was assessed by performing sandwich ELISA. **Results:** In both genders C-RP was higher in case of mild periodontitis as compared to severe one. In males raised serum level of C-RP was noticed in patients of cardiovascular disease along with periodontitis in comparison to those who had only chronic periodontitis. Male and female patients who had chronic periodontitis alone showed significantly less concentration of C-RP as compared to patients with chronic periodontitis along with heart disease. Highest level of C-RP was seen in both genders, with cardiac disease accompanied with mild periodontitis rather than with severe periodontitis. Furthermore, in all categories females showed relatively low C-RP. **Conclusion:** Mild state of chronic periodontitis is more pronounced threat towards cardiovascular disease, especially among males.

**Keywords:** Chronic Periodontitis, Cardiovascular Disease, C-reactive protein

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### INTRODUCTION

Chronic periodontitis is a chronic inflammatory condition of periodontal tissues (including gingiva, cementum, alveolar bone, and the periodontal ligaments) due to plaque accumulation. This plaque is formed by colonizing bacteria on the tooth surface which sticks on the tooth as a biofilm.<sup>1,2</sup> Chronic periodontitis is realised worldwide as an oral problem affecting the community.

Serum inflammatory mediator called C-reactive protein (C-RP), binds on the surface of the dead or dying cells, and some pathogenic bacteria activating the complements of immune mediated inflammatory reactions. C-reactive protein is also considered as a crucial bioinflammatory marker. Its level rises in chronic periodontitis and coronary heart disease (CHD).<sup>3</sup>

Elevated level of C-RP in case of chronic periodontitis and coronary heart diseases shows that it is a common inflammatory serum marker in both the chronic inflammatory diseases namely chronic periodontitis and CHD.<sup>4,5</sup>

C-reactive protein and TNF- $\alpha$  in periodontitis, initiates a cascade of biochemical reactions and causes endothelial damage that facilitates cholesterol plaque attachment, leading to the narrowing of vascular diameter and ultimately increases the chance for atherosclerosis.<sup>6</sup>

Low grade systemic inflammation and bacteremia occurs regularly in periodontitis. Such events may contribute to platelet activation and subsequent procoagulant state. Since platelet activation contributes to thrombosis which would lead to coronary heart disease.<sup>7,8</sup>

The work on connection of periodontitis with CHD also showed the same consistent relationship though there is paucity of related data in Pakistani population. It has been shown that in CHD patients having periodontitis, the non-surgical periodontal therapy significantly reduces the level of C-RP.<sup>9</sup>

Meta-analysis reports in Switzerland have identified associations between periodontitis and cardiovascular disease.<sup>10</sup> In last two decades, the association between periodontitis and cardiovascular diseases has earned greater consideration of biological scientists and researchers from all over the world.<sup>11,12</sup> There is evidence that periodontitis related to cardiovascular disease is more prevalent at the age of 30–70 years.<sup>13</sup>

This study was conducted to explore the relationship of chronic periodontitis with and without CVD with raised level of C-RP, which is a known inflammatory marker in cardiovascular disease and to study any difference gender wise. It may highlight the possible impact of preventive oral measures on minimising the risk of cardiovascular disease, as the

causative role of periodontitis in atherogenesis has been observed.<sup>14,15</sup>

**MATERIAL AND METHODS**

A total of 75 patients (46 males and 29 females) aged 30–70 years who offered informed consent were inducted for the examination of C-RP. Out of 46 males 19 had chronic periodontitis alone (12 severe and 7 mild cases) and 27 had cardiac disease along with periodontitis (21 severe and 6 mild cases). Out of 29 female patients, 15 had chronic periodontitis alone (10 severe and 5 mild cases) whereas 14 had cardiac disease along with periodontitis including equal number of patients (7 each) with severe and mild periodontitis.

Blood samples amounting to 5–6 ml from antecubital vein were collected from each patient and allowed to clot in disposable sterile syringes. Then the collected serum was placed in vacutainer serum separator tube to centrifuge at about 3,050 rpm for 6–7 minutes. Then this clear serum was stored at -20 °C till further use for biochemical marker examination.

Enzyme Immunoassay method was employed using the ELISA kits for C-reactive protein.

The reading of each plate was taken at 450 nm against a reference filter set at 650 nm followed by calculation of the mean of duplicate determinations. On linear graph paper, OD (optical density) values for each calibrator were plotted against the corresponding concentrations of C-RP and a calibration curve through the calibrator points was drawn by connecting the plotted points with straight lines. Finally, the readings of the concentrations for each control and sample were taken by interpolating the calibration curve.

**RESULTS**

Comparison of C-reactive protein concentrations in patient category 1 and 2 is given in Table-1.

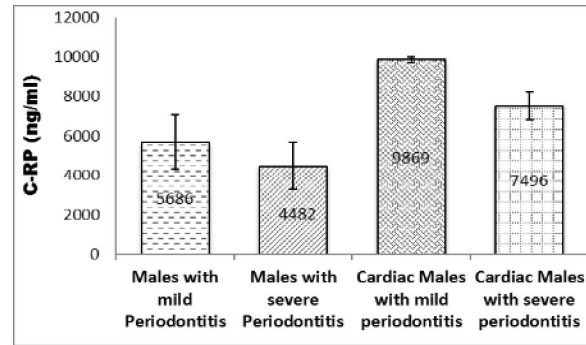
**Table-1: C-Reactive Protein concentration (ng/ml)**

Patients Category 1	Patients Category 2	p
Female patients diagnosed with cardiac problem as well as mild chronic periodontitis C-RP 9532	Female patients having mild chronic periodontitis alone C-RP 6195	0.005*
Cardiac male patients having severe chronic periodontitis C-RP 9869	Male patients having severe chronic periodontitis alone C-RP 4482	0.026*
Cardiac male patients having mild chronic periodontitis C-RP 7496	Male patients having mild chronic periodontitis alone C-RP 4482	0.017*

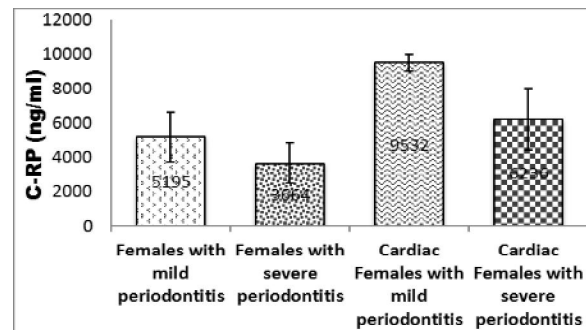
\*p<0.05

Comparison of serum C-RP concentration among all male and female patients having mild chronic periodontitis, severe chronic periodontitis, mild chronic periodontitis along with cardiovascular disease and severe chronic periodontitis along with cardiovascular disease is shown in Figure-1 and 2 respectively. The

difference was significant (p<0.05, 0.012 for males and 0.019 for females on ANOVA).

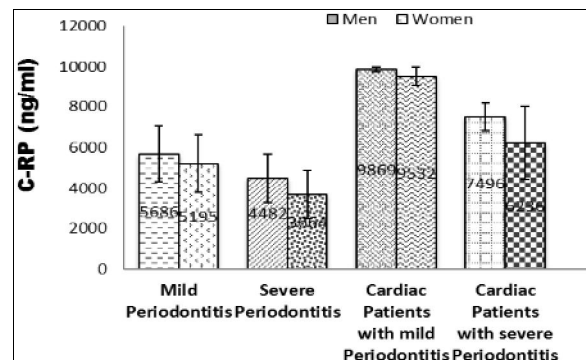


**Figure-1: C-RP concentration in mild and sever periodontitis in males**



**Figure-2: C-RP concentration in mild and sever periodontitis in females**

It was also noticed that maximum level of C-RP was observed in both the genders in patients having cardiac disease with mild type of periodontitis in comparison with those having cardiac disease with severe type of periodontitis. However, females revealed relatively low concentration of C-RP as compared to males in each category of disease showing significant difference (Figure-3). The difference was significant at p-value of 0.002 on ANOVA.



**Figure-3: Comparison of C-reactive protein concentration in males and females in all groups**

**DISCUSSION**

Association of increased level of C-RP with chronic periodontitis, as seen in the present study, is also

supported by other studies that have shown similar association with common inflammatory markers including C-RP.<sup>16</sup> Like in current study, C-RP has been shown to exhibit an important role in the pathogenesis of periodontitis and heart diseases.<sup>5,17</sup>

There is sufficient research evidence to support that C-RP is strongly related with periodontal disease, though there is insufficient information in support of profound association of C-RP with initial stage.<sup>18,19</sup> Raised serum level of C-RP has been reported in publications concerning low-grade inflammatory states and endothelial dysfunction.<sup>20,21</sup>

Role of C-RP along with other inflammatory agents in the manifestation of cardiac disease escalation was also reported in a USA based research.<sup>22</sup> Recent research, though on a modest data, also well demonstrates in the sample population, the pattern of rise of C-RP in patients with periodontitis with and without cardiac disease. Researchers<sup>23</sup> have verified the threat of atherosclerosis in males but not in females due to periodontitis which is in line with this study that also suggests that males are more vulnerable to heart disease in presence of chronic periodontitis.

On the contrary, some studies have shown elevated level of C-RP in females in comparison with males like African Black women have a higher value of C-RP as compared with Western White women.<sup>24,25</sup> These gender-based differences in C-RP levels may vary due to ethnicity.

Work done by researchers on chronic Periodontitis in comparison with advanced Periodontitis also confirmed that C-RP level was higher in advanced Periodontitis than in its chronic type.<sup>26</sup> This might be due to the fact that Advanced Periodontitis is more aggressive and acute sort of inflammation as compared to the chronic one, which is a slow ongoing process and also with less deteriorative effect. C-RP is considered an acute phase protein which is more pronouncedly involved in the early stages of inflammation<sup>27</sup>, so it might be a reason of getting raised level of C-RP in mild Chronic Periodontitis than in severe Periodontitis as indicated by the present study.

Furthermore, the co-existence of chronic periodontitis and cardiovascular disease further needs the attention of the researchers because by improving the oral public health, we can not only improve cardiac pathologies but can also prevent the coronary atherosclerotic heart disease (CAD).<sup>9,17,20,21</sup>

## CONCLUSION

C-RP is more profoundly associated with the initial stages of chronic periodontitis. Moreover, males exhibit relatively higher levels of C-RP, in chronic periodontitis with or without cardiac disease highlighting the importance of oral health, especially in males.

## LIMITAION OF THE STUDY

Body Mass Index and diet, which may act as confounders by affecting C-RP levels were not explored in this study.

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