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Original Research

Serum homocysteine levels in chronic periodontitis

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ABSTRACT:

Background: To assess the levels of serum homocysteine in chronic periodontitis. **Materials & methods:** A total of 50 subjects were enrolled. Out of which 25 were the case group and 25 were periodontally healthy individuals. In case group, 15 were female and 10 were male whereas in control group 18 were female and 7 were male. Laboratory investigations were done. All the data was collected and results were analyzed using SPSS software. **Results:** A total number of case group individuals 15 were female and 10 were male. Out of 25 cases, 6 had moderate periodontitis and 19 had severe periodontitis. The mean plasma Hcy was found to be 25.32 and 10.56 mmol/L, respectively, for cases and controls. The difference was statistically significant (P = 0.001). **Conclusion:** Elevated levels of serum homocysteine were seen in subjects with chronic periodontitis.

Keywords: chronic periodontitis, homocysteine, cardiovascular disease.

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INTRODUCTION

Periodontal disease is a chronic inflammatory infectious disease affecting the supporting tissues of teeth including gingiva, periodontal ligament, cementum, and alveolar bone. [1] Periodontitis, which is a constant potential source of infection, [2] has been considered as a separate risk factor for diabetes, cardiovascular diseases, cerebrovascular diseases, respiratory diseases, and low birth weight rheumatoid arthritis through common pathophysiological pathways. [3,4] Cardiovascular disease (CVD) is the single leading cause of morbidity and mortality globally as per the World Health Organization statistics, wherein < 50% of the patients with atherosclerosis lack identifiable risk factors. [5] As evidence documented that individuals with periodontitis have a greater risk of presenting endothelial dysfunction and cardiovascular diseases, the pathogenesis of periodontal disease and atherosclerotic disease can hence be related through common inflammatory cascades. [6]

Homocysteine (Hcy), a sulfur-containing amino acid, which in the recent past has become a biomolecule of great importance for biochemists and clinicians alike. Hcy is exported into plasma where it circulates, mostly in its oxidized form, bound to plasma proteins as a protein-Hcy mixed disulfide with albumin (protein-SS-Hcy). [7] Under normal circumstances, most but not all of the Hcy formed in transmethylation reactions is remethylated back to methionine or is converted into cysteine in transsulfuration reactions. The B-complex vitamins play an essential role in the transformation and the excretion of the Hcy metabolism pathway, the elevated levels of Hcy that is, hyper-Hcy (HHcy) has been associated with pathologic alteration in the vasculature, which is recognized as an independent cardiovascular disease risk factor. [8,9]

Not only this inflammatory biomarker associated with cardiovascular disease, but it has also been investigated in patients with rheumatoid arthritis, wherein the immunoinflammatory activation of rheumatoid arthritis contributes to the Hcy increase. [10] A positive corelation has also been shown to exist between the concentration of Hcy and circulating levels of C- reactive protein (CRP). [11] Inflammation and chronic infections such as periodontal disease are becoming the targets of interest as potential novel risk factors for CVDs. [12] Evidence also indicates that rise of plasma CRP and Hcy is risk factor for CVDs. Thus, it would be beneficial to attempt to reduce their circulating levels. Treatment of chronic periodontitis may form a link in decreasing the possible systemic inflammatory effects and reducing circulating levels

of CRP and Hcy, subsequently reducing the risk of CVDs. [13] Hence, this study was conducted to evaluate the levels of serum homocysteine in chronic periodontitis.

MATERIALS & METHODS

A total of 50 subjects were enrolled. Out of which 25 were the case group and 25 were periodontally healthy individuals. In case group, 15 were female and 10 were male whereas in control group 18 were female and 7 were male. Subjects with moderate or severe chronic periodontitis were considered for inclusion into the study. Laboratory investigations were done. All the data was collected and results were analyzed using SPSS software.

RESULTS

A total number of case group individuals 15 were female and 10 were male. Out of 25 cases, 6 had moderate periodontitis and 19 had severe periodontitis. The mean gingival index (P = 0.001) and mean simplified oral hygiene index (P = 0.001) for cases and controls showed significant differences. The mean plasma Hcy was found to be 25.32 and 10.56 mmol/L, respectively, for cases and controls. The difference was statistically significant (P = 0.001).

Table 1: Periodontal parameters and plasma homocysteine

Parameters	Cases (40) Mean	Controls (40) Mean	p-value
Gingival index	1.39	0.004	0.001*
Oral hygiene index	1.22	0.04	0.001*
Plasma homocysteine (micro mol/L)	25.32	10.56	0.001*

* : significant

Table 2: Comparison between plasma homocysteine levels and chronic periodontitis

Group	Number	Mean	p- value
Moderate periodontitis	6	26.32	0.54
Severe periodontitis	19	25.03	-

DISCUSSION

Periodontal pathogens, such as Porphyromonas gingivalis, are able to invade gingival tissues and gain access to the systemic circulation. [14] The current era of evidence-based medicine suggests that periodontitis affects the systemic health of an individual, and may contribute to CVD, diabetes mellitus, and preterm low-birth-weight infants. [15] Hcy is a sulfur-containing amino acid derived from methionine during its metabolism. The amino acid methionine is the only known source of Hcy in the human body. The average daily intake of methionine is about 2 g. [16] Hence, the levels of serum hcy in chronic periodontitis.

In the present study, a total number of case group individuals 15 were female and 10 were male. Out of 25 cases, 6 had moderate periodontitis and 19 had severe periodontitis. The mean gingival index (P = 0.001) and mean simplified oral hygiene index (P = 0.001) for cases and controls showed significant differences. A study by Mallapragda S et al, was done to assess the effect of nonsurgical periodontal therapy on circulating serum high-sensitivity capsule reactive protein (hs-CRP) and homocysteine (Hcy) levels in patients with chronic periodontitis. The study involved fifty participants. Mean serum hs-CRP and Hcy concentration in patients with chronic periodontitis were 3.37 ± 0.54 mg/L and 21.47 ± 7.93 μmol/L, respectively, and was significantly higher than the controls (1.68 ± 0.71 mg/L and 13.93 ± 8.30 μmol/L, respectively) (P < 0.05). Posttreatment, the mean serum hs-CRP and Hcy concentration reduced significantly in both test and control groups (P < 0.05). [17]

In the present study, the mean plasma Hcy was found to be 25.32 and 10.56 mmol/L, respectively, for cases and controls. The difference was statistically significant (P = 0.001). Another study by Joseph R et al, a case-control study involved 85 age- and sex-matched subjects with chronic periodontitis and 91 healthy controls. Patients were grouped into moderate and severe periodontitis. Case and control groups had similar levels of fasting blood sugar, lipid profile, and body mass index. The mean plasma Hcy was found to be 19.22 ± 8.27 and 10.27 ± 2.50 μmol/L for cases and controls, respectively. A significant elevation in plasma Hcy levels was observed in cases (P <0.05). No significant differences were observed in plasma Hcy levels between moderate and severe chronic periodontitis (P = 0.722). [18]

Another case–control clinical study by Penmetsa GS et al, included a total of 60 patients who were divided into two groups. At baseline, the mean levels of plasma Hcy were found to be low in the control group, whereas in the test group, it is found to be higher. These plasma-Hcy levels and all periodontal parameters were reduced significantly after nonsurgical periodontal therapy. The results demonstrated that plasma-Hcy levels are reduced after nonsurgical periodontal therapy but not to the levels comparable with those found in healthy individuals. Therefore, nonsurgical periodontal therapy may be used as an adjunctive Hcy-lowering therapy,

contributing toward primary prevention against cardiovascular diseases. [19]

CONCLUSION

Elevated levels of serum homocysteine were seen in subjects with chronic periodontitis.

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