

Original Research

Effect of non-surgical periodontal treatment on circulating homocysteine levels in otherwise healthy subjects

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ABSTRACT:

Background: Periodontal disease contributes significantly to the global burden of oral diseases and shares common risk factors with several chronic diseases. Homocysteine (Hcy) is a sulfur containing amino acid derived from methionine during its metabolism. Hence the purpose of present study was to assess effect of non-surgical periodontal treatment on circulating homocysteine levels in otherwise healthy subjects. **Materials & methods:** 20 systemically healthy adult male and females were selected. All the patients were divided into two study groups as follows: Study group: 10 untreated chronic periodontitis, Control group: 10 subjects selected from age and gender matched systemically and periodontally healthy subjects. Patients were evaluated using a detailed questionnaire. Demographic characteristics, such as age, gender, diet, and medical history, body mass index will be recorded. A set of full-mouth periapical radiographs was taken. Study group received non-surgical periodontal therapy, two 1hr sessions of scaling and root planing using gracey curettes and ultrasonic scaler over 4 weeks. Subjects were followed up every 15 days for 3 months oral hygiene instruction was reinforced in every visit. Serum homocysteine was assessed by means of Elisa Immunoassay. **Results:** Mean Serum homocysteine levels among patients of chronic periodontitis group and healthy control was 21.5 $\mu\text{mol/L}$ and 15.3 $\mu\text{mol/L}$ respectively. While comparison of Serum homocysteine levels among subjects of both the study groups at baseline, significant results were obtained. While comparison of Serum homocysteine levels among subjects of chronic periodontitis group pre-treatment and post treatment, significant results were obtained. **Conclusion:** Increase in periodontal inflammation is accompanied by a substantial increase in the concentration of Hcy levels.

Key words: Homocysteine, Periodontal

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INTRODUCTION

Periodontal disease contributes significantly to the global burden of oral diseases and shares common risk factors with several chronic diseases. In recent years, periodontal disease has been implicated in the onset and development of cardiovascular diseases, including atherosclerosis, cerebrovascular and coronary artery diseases,^{1, 2} rheumatoid arthritis,³ diabetes mellitus,⁴ occlusive respiratory diseases,⁵ and preterm low birth weight.⁶ Chronic low-grade inflammation is emerging as a conceivable etiologic mechanism linking periodontal disease and the conditions cited above, as well as other systemic diseases.⁷

Homocysteine (Hcy) is a sulfur containing amino acid derived from methionine during its metabolism. Elevated levels of plasma Hcy/hyperhomocysteinemia

(HHcy) have been linked to the oxidative damage of the vascular endothelium, proliferation of vascular smooth muscles, and lipid peroxidation, which could result in atherothrombosis and peripheral arterial disease. Plasma Hcy as a biomarker of inflammation has been investigated in studies on subjects with rheumatoid arthritis (RA). A positive relation exists between the concentration of Hcy and some biohumoral parameters of inflammation, such as circulating levels of soluble receptors for cytokines, adhesion molecule (sI cam-1) and C-reactive protein.⁸⁻¹⁰ Hence the purpose of present study was to assess effect of non-surgical periodontal treatment on circulating homocysteine levels in otherwise healthy subjects.

MATERIALS & METHODS

The present study was conducted for assessing the effect of non-surgical periodontal treatment on circulating homocysteine levels in otherwise healthy subjects. 20 systemically healthy adult male and females were selected. Inclusion criteria for present study included:

- Age 35 - 55 yrs.
- Subjects with presence of atleast 20 natural teeth with no untreated periapical lesion
- Subject with at least two teeth with probing depth (PD) ≥ 5 mm, clinical attachment loss ≥ 6 mm, and radiographic evidence of alveolar bone loss.⁵
- Patient who signed informed consent form.
- Patient should be cooperative and ready to follow the oral hygiene instructions.

All the patients were divided into two study groups as follows:

Study group: 10 untreated chronic periodontitis,

Control group: 10 subjects selected from age and gender matched systemically and periodontally healthy subjects

Patients were evaluated using a detailed questionnaire. Demographic characteristics, such as age, gender, diet, and medical history, body mass index will be recorded. A set of full-mouth periapical radiographs was taken. Study group received non-surgical periodontal therapy, two 1hr sessions of scaling and

root planing using gracey curettes and ultrasonic scaler over 4 weeks. Subjects were followed up every 15days for 3 months oral hygiene instruction was reinforced in every visit. Serum homocysteine was assessed by means of Elisa Immunoassay. All the results were analyzed by SPSS software. Chi-square test and Mann-Whitney U test were used for assessment of level of significance.

RESULTS

In the present study, mean age of the subjects of the control group and the chronic periodontitis group was 38.6 years and 39.1 years respectively. Age was found to be comparable in between both the study groups. There were 6 males and 4 females in the control group and 7 males and 3 females in the chronic periodontitis group. Gender wise distribution was found to be comparable in between both the study groups. Mean Serum homocysteine levels among patients of chronic periodontitis group and healthy control was 21.5 $\mu\text{mol/L}$ and 15.3 $\mu\text{mol/L}$ respectively. While comparison of Serum homocysteine levels among subjects of both the study groups at baseline, significant results were obtained. While comparison of Serum homocysteine levels among subjects of chronic periodontitis group pre-treatment and post treatment, significant results were obtained.

Table 1: Comparison of Serum homocysteine ($\mu\text{mol/L}$) levels among subjects of both the study groups

Number of patients	Healthy controls	Chronic periodontitis (Pre-treatment)	P- value
Mean	15.3	21.5	0.00 (Significant)
SD	3.2	3.9	

Table 2: Serum homocysteine ($\mu\text{mol/L}$) levels among subjects of both the study groups

Number of patients	Chronic periodontitis (Pre-treatment)	Chronic periodontitis (Post-treatment)	P- value
Mean	21.5	12.35	0.00 (Significant)
SD	4.82	3.42	

DISCUSSION

Inflammation is the physiological response to a variety of injuries or insults, including heat, chemical agents or bacterial infection. In the acute phase of inflammation, the response is rapid and of short duration. If the insult or injury is not resolved, the response becomes chronic, which can be considered as nonphysiologic or pathologic. When inflammation becomes chronic, the adaptive immune response is activated with involvement of the cellular and non-cellular mechanisms of acquired immunity. Immune mechanisms play further roles in the resolution of inflammation and in the healing process, including the repair and the regeneration of lost or damaged tissues. Thus, innate (inflammatory) immunity and acquired immunity must be coordinated to return the injured tissue to homeostasis.⁵⁻⁹ Hence the purpose of present study was to assess effect of non-surgical periodontal treatment on circulating homocysteine levels in otherwise healthy subjects.

In the present study, mean age of the subjects of the control group and the chronic periodontitis group was 38.6 years and 39.1 years respectively. Age was found to be comparable in between both the study groups. There were 6 males and 4 females in the control group and 7 males and 3 females in the chronic periodontitis group. Gender wise distribution was found to be comparable in between both the study groups. Mean Serum homocysteine levels among patients of chronic periodontitis group and healthy control was 21.5 $\mu\text{mol/L}$ and 15.3 $\mu\text{mol/L}$ respectively. Yan et al have reported a linear association between Hcy and hs- CRP and stated that combination of increased Hcy (≥ 18 $\mu\text{mol/L}$) with increased hs- CRP levels (>3 mg/L) has a stronger predictive value and is a more precise risk factor for new vascular events than increased hs- CRP or increased total Hcy levels alone.¹⁰

In the present study, while comparison of Serum homocysteine levels among subjects of both the study

groups at baseline, significant results were obtained. While comparison of Serum homocysteine levels among subjects of chronic periodontitis group pre-treatment and post treatment, significant results were obtained. George et al determined whether the presence of chronic periodontitis and subsequent non- surgical periodontal therapy could influence the serum levels of interleukin- 6 and C- reactive protein (CRP) in patients with severe chronic generalized periodontitis. Sera were obtained from 25 patients with periodontitis for baseline examination and reassessment after completion of treatment. As a control, sera were also obtained from 20 subjects without periodontitis. Interleukin- 6 level tended to decrease with improvement of the periodontal condition following treatment and approached that of control subjects, and this decline was statistically significant. The hsCRP levels also showed a decreasing trend following periodontal treatment. Periodontal disease significantly affected the serum levels of systemic inflammatory markers and that non- surgical periodontal therapy could bring about a decrease in the levels of these inflammatory markers.¹¹

CONCLUSION

Increase in periodontal inflammation is accompanied by a substantial increase in the concentration of Hcy levels.

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