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## Original Article

### Study on Correlation of Stress and Periodontal Status

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#### ABSTRACT:

**Introduction:** Psychological disturbances can lead patients to neglect oral hygiene with resultant unfavorable effects on the periodontal tissues. Growing evidence suggests that the psychosocial factors such as stress, depression, and level of social support provoke changes in host defense mechanisms that modify the disease process. In view of this, the present study is an attempt to evaluate the association of stress and periodontitis. **Material and Methods:** The present study was carried out among 50 subjects both male and female who visited the institute for dental treatments. Patients were divided into 2 groups: Group I included patients with chronic periodontitis and group II consisted of individuals with healthy periodontium. Clinical measures such as OHI-S, PI, clinical attachment level (CAL) were measured. The serum cortisol levels were measured using enzyme-linked fluorescent assays. Unpaired 't' test and Pearson's correlation coefficient was used for statistical analysis. **Results:** The present study revealed a significant difference among OHI-S, Plaque index (PI) and of serum cortisol levels among age matched patients with chronic periodontitis patients and without chronic periodontitis and a positive co-relation of serum cortisol level and clinical attachment level was found in chronic periodontitis patients. **Conclusion:** The present study suggests a positive co-relation of serum cortisol level and chronic periodontitis. Thus, psychosocial stress may be associated with periodontal destruction through behavioral and physiologic mechanisms and hence represents a risk indicator for periodontal disease and should be addressed before and during treatment.

**Keywords:** Cortisol; Periodontitis; Psychosocial factors; Stress

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#### INTRODUCTION

Periodontitis is the inflammation and infection of the tissues that support the teeth. Growing evidence suggests that the psychosocial factors such as stress, depression, and level of social support provoke changes in host defense mechanisms that modify the disease process.<sup>1</sup> Creating completely no plaque in the oral cavity is impossible and even non-physiological. On the other hand, the amount of plaque accumulation and pathogenic organisms can be minimized, if appropriate immune response is being provided, and hence can preserve gingival and periodontium health. Some chronic recurrent diseases, like periodontal diseases, have a progressive period, during which the probable role the stress could play is in exacerbation which is the subject of an investigation by psychoneuroimmunology.<sup>2</sup>

The influence of stress on periodontal health is not only by its presence or absence but the type, duration and the way

by which an individual copes with it as a person under stress tends to adopt behavioural changes like poor oral hygiene maintenance, smoking, clenching or grinding of teeth.<sup>3</sup> Hence, present study was undertaken to evaluate the correlation of stress on chronic periodontitis.

#### MATERIAL AND METHODS

The present study was carried out among 50 subjects both male and female who visited the institute for dental treatments. The patients aged 25 to 50 years without any systemic illness were included in the study. Patients on any antibiotic, chemotherapeutic or antipsychotic drugs; patients who had undergone periodontal treatment 6 months before the examination and diabetic patients were excluded from the study. Patients were divided into 2 groups: Group I included patients with chronic periodontitis and group II consisted of individuals with healthy periodontium (who

were free from periodontal problems) and reported for other treatment procedures. All subjects were submitted to stress and anxiety evaluations. Stress was measured by the Stress Symptom Inventory (SSI) and the Social Readjustment Rating Scale (SRRS), while the State-Trait Anxiety Inventory (STAI) was used to assess anxiety.<sup>4</sup> Clinical measures such as OHI-S, PI, clinical attachment level (CAL) were measured. Patient's medical history and socioeconomic data were also recorded. About 3–5 ml of blood was collected by venipuncture, from the median cubital vein between 9 and 11 in the morning from the subjects after 20 min of rest to the subject. The serum cortisol levels were measured using enzyme-linked fluorescent assays. Unpaired 't' test and Pearson's correlation coefficient was used for statistical analysis.

**RESULTS**

**Table 1:** Mean± Standard deviation of various parameters

Parameters	Mean± Standard deviation		p value
	Group I (With Chronic Periodontitis)	Group II (Without Chronic Periodontitis)	
Age	49.30±4.20	47.60±6.40	>0.05
OHI-S	5.57±0.43	1.04±0.54	<0.05
Plaque index (PI)	1.75±0.27	0.84±0.31	<0.05
Serum cortisol levels	23.58±0.65	13.56±1.04	<0.05

Table 1 shows significant difference among OHI-S, Plaque index (PI) and of serum cortisol levels among age matched patients with chronic periodontitis patients and without chronic periodontitis. Mean± Standard deviation of OHI-S, plaque index (PI) and serum cortisol level was 5.57±0.43, 1.75±0.27 and 23.58±0.65 in group I (with chronic periodontitis) patients and 1.04±0.54, 0.84±0.31 and 13.56±1.04 in group II (without chronic periodontitis) patients.

**Table 2:** Pearson's co-relation of Serum cortisol level and CAL

Chronic Periodontitis patients	Pearson's co-relation
Serum cortisol level and CAL	0.680

Table 2 shows positive co-relation of serum cortisol level and clinical attachment level with Pearson's co-relation value of 0.680 in Chronic Periodontitis patients.

**DISCUSSION**

Stress is compatible with good health, being necessary to cope with the challenges of everyday life. Problems start when the stress response is inappropriate to the intensity of the challenge and it has been reported that periodontal disease is more widespread and severe in those with higher levels of stress. Psychological disturbances can lead patients to neglect oral hygiene with resultant unfavorable effects on

the periodontal tissues. The association of stress with periodontal disease is difficult to prove as there are many factors influencing the incidence and severity of periodontal disease, some of which are assumed and have not been identified.<sup>5</sup> In view of this, the present study is an attempt to evaluate the association of stress and periodontitis. Stress can modify the periodontal status of an individual with poor immune functions through changes in psychosocial such as oral sanitation, tobacco use, drugs and nutritional intake and physiological that includes alteration in saliva and gingival fluid circulation, hormonal imbalances and altered immune responses factors.<sup>6</sup>

The present study revealed a significant difference among OHI-S, Plaque index (PI) and of serum cortisol levels among age matched patients with chronic periodontitis patients and without chronic periodontitis and a positive correlation of serum cortisol level and clinical attachment level was found in chronic periodontitis patients. Vettore MV et al<sup>4</sup> investigated the relationship of stress and anxiety with periodontal clinical characteristics and reported that subjects with high levels of trait anxiety appeared to be more prone to periodontal disease. Haririan H et al<sup>7</sup> measured salivary and serum chromogranin A (CgA) and α-amylase in periodontal health and disease and found significantly higher CgA levels in the saliva of patients with aggressive periodontitis compared with those in patients with chronic periodontitis and healthy control individuals. The results revealed an association of CgA and cortisol levels as well as α-amylase activity in saliva with periodontitis, especially a significant relationship of salivary chromogranin A and cortisol to aggressive periodontitis. Similarly, Mannem S et al<sup>8</sup> carried out a clinicobiochemical study regarding the effect of stress on periodontitis and established a significant association between work tension (P=0.04), economic problems (P<0.0001), insecure job (P=0.003) and chronic periodontitis.

da Silva AM et al<sup>9</sup> reviewed the available literature regarding psychosocial factors in inflammatory periodontal diseases and suggested that psychosocial factors may be involved in the aetiology of inflammatory periodontal diseases, and this would add to clinical management of these conditions. Rai B et al<sup>10</sup> carried out a study to evaluate the correlations among periodontal disease, psychologic factors, and salivary markers of stress, psycho neuroimmunologic variables, and health behaviors and found that stress and salivary stress markers were significantly correlated with clinical parameters of periodontal disease. Neglecting to brush teeth during stress was associated with missing teeth. After adjusting for stress variables, salivary cortisol and β-endorphin were significantly associated with tooth loss and periodontal clinical parameters. Linden et al<sup>11</sup> predicted the future attachment loss depending on the following criteria: age, socio-economical level, a less satisfactory professional life and a passive and dependant character. Rosania AE et al<sup>12</sup> studied the associations between psychologic factors,

markers of periodontal disease, psycho neuroimmunologic variables, as well as behavior and stress, depression, and salivary cortisol were correlated with measures of periodontal disease. Axtelius B et al<sup>13</sup> has suggested that patients with psychosocial strain and passive dependent traits did not respond as well as patients with less stressful psychosocial situation and with a rigid personality to periodontal treatment

Stress hormones bring about a shift from T helper cell phenotypes to TH2 cell dominance, thereby causing progression of periodontitis. High cortisol levels may be especially negative on periodontal tissue because of the extremely fast turnover of some periodontal components. Collagen production from fibroblasts is shown to be decreased due to the increase in the amounts of glucocorticoids and sulphated glycosaminoglycans. If inflammation is already present these mechanisms are sufficient to bring about the breakdown of periodontal tissues.<sup>6</sup>

The role of stress in periodontitis has a conceivable pathological concept. This is because stress can cause behavior variation and increase at-risk behaviors such as smoking, alcohol abuse, and improper oral hygiene due to reduced compliance with dental care as well as some immunosuppressive effects.<sup>14</sup>

### CONCLUSION

The present study suggests a positive co-relation of serum cortisol level and chronic periodontitis. Thus, psychosocial stress may be associated with periodontal destruction through behavioral and physiologic mechanisms and hence represents a risk indicator for periodontal disease and should be addressed before and during treatment. Focusing on psychologic factors, represents an imperative part for periodontium treatment

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