

## ESTIMATION AND COMPARASION OF SERUM CORTISOL LEVEL AND ACADEMIC PSYCHOLOGICAL STRESS AND THEIR EFFECT ON CHRONIC PERIODONTITIS

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### ABSTRACT:

**Objectives:** Various risk factors are implicated in the pathogenesis of periodontal disease like uncontrolled diabetes, smoking, specific infections, age, and some Psychological conditions as psychosocial stress ,anxiety and depression. The aim of the present study was to study the association between psychological stress and chronic periodontitis. **Materials and Methods:** 60 patients were included in this study and divided into two groups. Group I comprised of 30 chronic periodontitis subjects. Group II comprised of 30 stressed subjects. Their stress level was assessed using a social readjustment rating scale. Plaque index (PI), gingival index (GI), periodontal disease index (PDI) and serum cortisol level were also measured. **Results:** patients with chronic periodontitis showed a statistically significant correlation ( $P < 0.05$ ) between serum cortisol and clinical parameters. **Conclusion:** Stress may be a contributing factor in periodontal disease.

**Keywords:** Cortisol, periodontal disease, smoking and stress.

### INTRODUCTION

Periodontitis is an inflammatory response of the periodontium which involves the destruction of the investing tissues around the teeth, resulting in loss of tooth support, ultimately leading to the tooth loss. The etiology and pathogenesis of periodontal disease are multifactorial. Numerous risk factors are involved like uncontrolled diabetes, smoking, specific infections, age,

psychosocial stress and certain psychosomatic conditions like anxiety and depression. (1,2,3) Stress is a state of physiological or psychological strain originated by adverse stimuli (physical, mental, or emotional, internal or external) that tend to disturb the functioning of an organism and which the organism naturally desires to avoid. (4) Socioeconomic factor, type of

occupation, daily schedule, competitive work load, emotional disturbances, etc. have led to increased stress levels in the modern lifestyle.(5)

Stress has a direct effect on the hypothalamus-pituitary-adrenal cortex axis. (6,7) It is hypothesized that prolonged activation of this axis can be detrimental to health and may provide a link between mental stress and physical illness. (8,9,10) Release of stress hormones impairs host defense which helps in the growth of opportunistic organisms in the gingival sulcus. (7)

Stress is also associated with certain masochistic habits like lip biting or cheek biting and habitual grinding of teeth. Also associated with Traumatic ulcers, apthous ulcers, (11) lichen planus (12,13)

Systemic disorders like gastritis, ulcerative colitis and overeating are also linked to stress. (14) The impact of stress on periodontal health is not merely by its presence or absence but the type, duration and how an individual copes with it. Individuals under stress tend to adopt behavioural changes like poor oral hygiene maintenance, smoking, clenching or grinding of teeth.

Some studies have shown a positive correlation between stress and periodontal disease. (15,16,17,18) whereas others did not show any correlation between the two. (19,20,21)

## MATERIALS AND METHODS

A cross-sectional study was conducted by the Department of Periodontology, and Implantology, Mahatma Gandhi Dental college and Department of Clinical Biochemistry, Mahatma

Gandhi medical college and Hospital, Jaipur(Rajasthan). An ethical clearance was obtained for the study from the ethical committee, Mahatma Gandhi dental college ,Jaipur. involving a sample size of 60 patients, to evaluate the psychological stress and salivary cortisol levels and their effect on chronic periodontitis.

### Inclusion criteria

- Subjects in the age range of 30-55 years.
- Minimum 20 teeth excluding the third molars should be present in the dentition.

### Exclusion criteria

- Systemically ill subjects.
- Subject on any antibiotic, steroidal, chemotherapeutic or antipsychotic drug therapy.
- History of professional oral prophylaxis within the last 6 months.
- Use of chemical methods of plaque control.
- Pregnancy.
- Patients who were using immunosuppressive drugs
- Patients who had undergone periodontal treatment six months before examination.
- Patients who were using corticosteroid drugs chronically

All participants answered a questionnaire on the demographic variables and socioeconomic level, smoking, health history, and health problems.

Probing Pocket Depth and Clinical Attachment Level were measured and recorded to the nearest millimeter, at six sites per tooth, using the William's periodontal probe . Individuals with a probing depth  $\geq 4$  mm and CAL  $\geq 3$  mm at the same site, in at least four teeth, were considered

to have chronic localized periodontitis.(22) The plaque was assessed by using the Sillness and Loe plaque index (1964).(23)

After the clinical examinations, 1.5 ml of venous blood sample was drawn in the morning between 9:00 and 11:00 am after 20 min of rest for the subject. The serum cortisol levels were measured using enzyme-linked fluorescent assays (VIDAS® Cortisol, Biomerieux, Marcy l'Etoile, France).

## RESULTS

**Table 1. Showing Relationship of 2 Groups & Values of t – test and p; SIG statistically significant value**

	<b>GROUP I CHRONIC PERIODONTITIS PATIENTS</b>	<b>GROUP II CHRONICALLY STRESSED PATIENTS</b>	<b>p (student t – test)</b>
<b>SAMPLE SIZE</b>	30	30	
<b>STRESS SCALE VALUE Mean +/- SD</b>	156 +/- 75.6	249 +/- 50	<b>t = -5.62; p &lt; 0.05: SIG</b>
<b>SERUM CORTISOL LEVEL (mcg/dl) Mean +/- SD</b>	24.9 +/- 2.1	31.2 +/- 2.97	<b>t = -9.487; p &lt; 0.05: SIG</b>

The results of the present study showed psychosocial stress to be a contributing factor. A statistically significant correlation was found between serum cortisol and severity of Periodontitis.

## DISCUSSION

From the present study, it was noted that the stress factor has an important bearing upon plaque and periodontal disease, wherein the more stress, more is the periodontal disease. Further it can also be evaluated that high-stress strung

### Group I

The mean stress scale value was 156.00± 75.6. Statistically significant correlation (P<0.05) between cortisol and PDI; and cortisol and PI were found. A positive correlation was found between stress and cortisol and stress and PDI.

### Group II

The mean stress scale value was 249 ± 50. A positive correlation between stress and cortisol, stress and clinical parameters, and cortisol levels and clinical parameters.

patients had higher cortisol levels among the smokers in the group II.

These results are in correlation with the study done by Ishisaka *et al.*(24) They examined 467 subjects for serum cortisol levels, psychological stress and periodontal clinical parameters. A significant correlation was found between serum cortisol and severity of periodontitis.

Deinzer *et al.* conducted a study to assess the effect of academic stress on oral hygiene. (25) The medical students participating

in examination were studied against the control students. It was concluded that psychosocial stress may induce neglect from oral hygiene.

However, Monteiro da Silva 1998 found no correlation between psychosocial stress and periodontal disease. (19) He studied the psychological status in 40 patients with aggressive periodontitis and 40 with chronic periodontitis. No association was found between psychological factor and periodontal disease.

The present study had the following limitations:-

- Sample size was small. Larger sample size will provide more conceptual evidence.
- The present study had very few female participants hence the effect of stress among the woman population was not sufficiently determined.
- The role of stress along with other manifestations like bruxism, lichen planus, oral submucous fibrosis and recurrent aphthous ulcers could also be associated along with periodontal disease. It was coincidental finding that three patients were having submucous fibrosis.
- The study was also restricted to lower-middle class or lower-class families who by virtue of their economic strata were subjected to high stress and strain.

## CONCLUSION

The results of the present study showed psychosocial stress to be contributing factor in the pathogenesis of periodontal disease and increased serum cortisol level. Also smoking was found as contributing factor for increased cortisol level which was statistically significant. Further representative research is needed to determine the impact of stress/psychological factors as risk factors for periodontal disease.

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