

To Evaluate the Relation Between Psychological Stress and Periodontal Disease: A Preliminary Cross-Sectional Study

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ABSTRACT

Background: Stress can be described as a process with both physiological and psychological components. Stress has become a part of one's life, which results in the development of depression and anxiety. This is commonly thought to have a net-negative effect on the efficacy of the immune response, subsequently resulting in periodontal breakdown. The purpose of this study was to evaluate the relation between psychological stress and periodontal disease.

Materials and Methods: Group sample size includes 100 participants (50 Stressed and 50 non -Stressed in each group) between age 25-60 years (44 males,56 females). Perceived stress scale, OHI-S, Probing pocket depth were recorded.

Result: Stressed individuals were more prone to periodontitis, poor oral hygiene and prevalence was more common in female than male participants. Statistical Analysis: There was statistically significant difference (CHI square test) and mean showed $P=0.001$ in findings between stressed and non stressed individuals.

Conclusion: It was found that in this pilot study that stressed individuals had greater risk of periodontitis as compared to non stressed individuals.

Keywords: Stress, periodontal disease.

INTRODUCTION

According to National Mental Health survey ¹ in 2015-16 conducted across 12 states at one point of time, results showed that nearly 11% of Indians above 18 years are suffering from mental disorders and most of them don't seek for medical consultation. Stress originates from a Latin word "stringere" which means "tight," "strained" and the concept was first introduced in the life science by Hans Selye in 1936 ^{2,3}. It has an accurate physiological definition, i.e., it is a state of physiological and psychological strain caused by an adverse stimuli, physical, mental or emotional, internal or external that tends to perturb the

functioning of an organism and which an organism naturally tries to circumvent. Thus, "stress" can be described as a process with both physiological and psychological components.

Periodontal disease is multifactorial with various relations between bacteria and host responses which is often customized by behavioural factors. Stress is considered as a contributing feature in periodontal disease. Studies showed a strong relationship between periodontal diseases and psychological factors such as stress, distress, anxiety, depression and loneliness. The factors acts

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as stressors and are responsible for such an association which could be due to modulation of the immune system or immunosuppression, leading to increased blood levels of adrenocorticotrophic hormones, alteration of crevicular cytokine levels, depressed polymorphonuclear leukocyte chemotaxis and phagocytosis, reduced proliferation of lymphocytes, changes in blood circulation and healing, modification of the salivary flow and its components and endocrine changes.⁴

Life style modifications can also affect stress due to changes such as smoking and alcohol, an unhealthy diet, obesity and neglect of oral hygiene, leading to decreased host response and an increased risk for severe periodontal disease.^{3,20,21}

OBJECTIVES

- 1) To measure the perceived stress scale, probing pocket depth, oral hygiene status among participants taking part in study.
- 2) To find any gender based bias in terms of stress and periodontal status among participants.
- 3) To evaluate the difference in oral hygiene status and probing pocket depth among stress and non stressed individuals.

MATERIALS AND METHODS

After Ethical clearance was obtained from the Ethical committee of the institute, this prospective cross-sectional study was done for participants visiting to the outpatient department (OPD) of the Department of Periodontology in AMC Dental College of Dentistry, Ahmedabad, India from age group 25- 60 years with final sample size 100 and no gender bias. The nature of the study was explained to all the participants, written consent was obtained. Perceived stress scale, oral hygiene status of patient and clinical parameters were noted by one principal investigator only.

The study group was divided into two groups:

1. Group I – Participants with chronic periodontitis (non stressed individuals)
2. Group II – Stressed participants with chronic periodontitis

Participants having high stress levels scored twenty points or higher on the Perceived Stress Scale by Cohen *et al* were included in group 2.

Method of collection of data

Collected data was entered in Microsoft excel (2010) spreadsheet to prepare master chart and excel sheet was forwarded to statistician for statistical analysis.

Inclusion criteria:

- 1) Participants within the age group of 25-60 years, diagnosed with periodontal disease and willing to provide informed consent with no gender bias.
- 2) Participants who had scored twenty points or higher (Group II) on the Perceived Stress Scale by Cohen *et al* were in group 2 and less than twenty points were included in group 1.

B) Exclusion criteria:

- 1) All the participants were excluded who do not fall in age category mentioned above, on having any other systemic disease except known psychological problem, pregnant and lactating mothers and not willing to provide informed consent.
- 2) Any periodontal treatment done within past 6 months.

Screening examination

Patients were asked about the basic demographic details including age, past medical and dental history, frequency of brushing, type of dentifrice, brushing technique, interdental aid if used were recorded. Also presence of any adverse habit like tobacco, smoking or any other parafunctional habits was recorded. Evaluation of stress by the subject on ten-point scale was recorded, and stress level was evaluated for each patient using Perceived Stress Scale by Cohen *et al*. 1994.

Periodontal parameters:

Probing pocket depth, Oral hygiene index-simplified (OHI-S) were recorded for each participant.

Statistical analysis

Sample size = $2 * (Z_{\alpha/2} + Z_{1-\beta})^2 / (m_1 - m_2 / \sigma)^2$

The Collected data was entered in Microsoft excel (2010) spreadsheet. Appropriate descriptive statistical test were computed and statistical analysis was done.

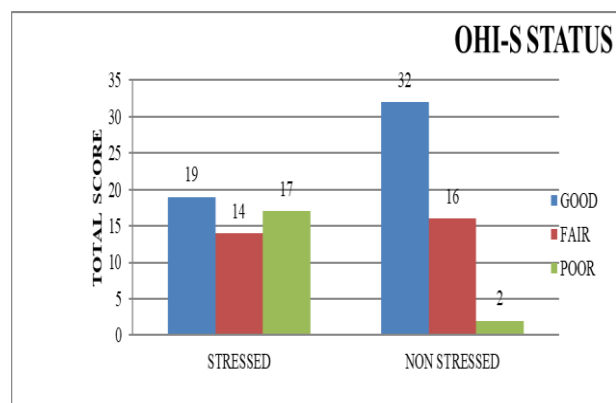
Statistical Test: Statistical analysis using independent t test for all statistical analysis probability levels of $P < 0.05$ was consider statistically significant.

RESULTS



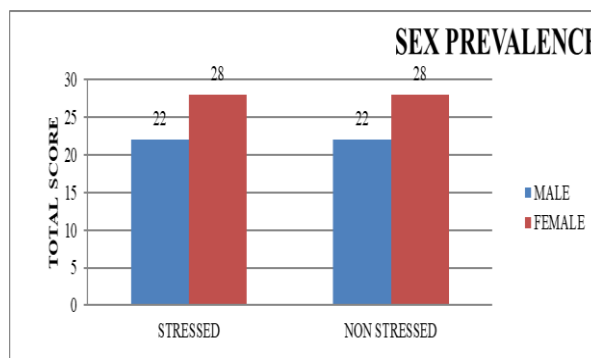
Graph 1: Prevalence of periodontal disease.

The prevalence of gingivitis was more common in Non Stressed participants(35) as compared to Stressed ones(19),while in case of periodontitis it was more common in Stressed participants(31) as compared to Non Stressed participants(15).



Graph 2: OHI- S Status.

Out of **50 Stressed participants**,19 showed good oral hygiene,14 showed fair oral hygiene and 17 showed poor oral hygiene while in **50 Non Stressed participants**,32 showed good oral hygiene,16 showed fair oral hygiene and 2 showed poor oral hygiene



Graph 3: Gender based prevalence of participants.

No significant difference between male and female participants.

There was statistically significant difference (CHI square test) and mean showed **P=0.001** in findings between **Stressed** and **Non Stressed** participants.

DISCUSSION

Periodontal disease is a socially patterned condition affected by various factors. Psychological stressors are external stimuli that induce stress and have been shown to play an lead role in periodontitis because they are able to influence the periodontitis and/or affect periodontal tissues directly. As the global burden of periodontal disease which is increasingly high, and the importance of stress as a modifiable risk factor for periodontal diseases we conducted this study pertaining to the role of stress in periodontal diseases.

In present study, the relationship between stress and periodontal disease had been evaluated using perceived stress scale by Sheldon Cohen in 1994¹⁰. The Perceived Stress Scale is the most validated tool and widely used among self reported measures. It comprises 14 items that rate stress based on the frequency of difficult life time events in a period of 1 month. There are 2 short versions of the Perceived Stress Scale: Perceived Stress Scale-4; and Perceived Stress Scale-10. As perceived stress scale has a large impact on cortisol level , scores tend to be positively correlated with biomarkers of stress most importantly serum or salivary cortisol levels. Other biomarkers are epinephrine, dopamine, adrenaline, immunologic (IL-6, TNF alpha, C reactive protein and metabolic bio markers (high BP, increased heart rate, high BMI) but these are less reliable indicators^{16,17,18,19}

Studies done in past by Moss et al in 1996⁵, Genco et al in 1999⁶, hugoson et al in 2002⁷, Sabbah et al in 2011⁸ all showed positive correlation between psychological stress and periodontitis. Recently, Refulio *et al*⁹, showed a strong relationship between emotional depression, level of anxiety, and the risk of having chronic periodontitis. The results of this study were in accordance with studies done in past as listed above. However studies done by Solis et al¹¹, Castro et al¹², Mengel et al¹³, Vedhera et al¹⁴ with different psychological scale showed no positive correlation between stress and periodontal disease.

There was statistically significant association of stressed individuals with periodontitis with poor oral hygiene and it was more common in female than male participants. The OHI-S status for fair participants results in range of (near to 1.2 to 1.5) in non Stressed participants while for stressed participants in range of (near to 2.7 to 3). Also they were more prone to deleterious habits like tobacco, alcohol etc

No biologic marker or any other measurable mean gold standard is available to safely define most psychiatric disturbances is available¹⁵. Usually, the psychological variables are measured by self-reported scales and do not allow an assessment of the subjective and behavioural aspects of individuals. When this type of instrument is used in research, one should bear in mind that the informer may supply incorrect information and that situation bias also may take place and there may be conflicting results. Discrepancies in the results found in the various studies may be explained by differences in the psychometric instruments or scale used and the diversity of the psychological factors variables examined.

Within the limitations of this study, it was concluded that there was significant difference in the frequency distribution of periodontitis between individuals stressed and non stressed individuals. In addition, the clinical parameters suggests predilection of periodontal disease toward stress.

SCOPE OF STUDY

Futuristic studies considering larger sample size are needed for significant correlation between stress and periodontal disease. In addition, in this regard, a comprehensive outcome is possible if biochemical

parameters such as cortisol level in serum and saliva are carried out.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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