Effects of Academic Stress on Gingival and Periodontal Health - A Questionnaire Study

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Abstract :

Background: Stress is a state of physiological or psychological strain caused by adverse stimuli, physical, mental or emotional, internal or external, that tend to disturb the functioning of to avoid an organism and which the organism naturally desires. Several corelational questionnaires have observed a positive relationship between psychological stress and periodontal diseases. This study aimed at studying the prevalence of periodontal disease and its relationship to stress in students in ITS dental college educational society campus in Ghaziabad.

Materials and Method: The study included 104 subjects between the age of 18-30 years. The subjects were informed about the study goals and also requested to sign consents. The questionnaire included parts from generic stress questionnaire for students from Ministry of social security, National Solidarity and Reforms Institutions. The clinical examination included, Gingival Index (Bleeding on probing) and Probing Pocket Depth.

Results: A significant relationship was found between gingival inflammation and psychological stress. Statistical tests of ANOVA (analysis of variance) and post Hoc bonferroni (Multiple comparison)were applied to compare and evaluate the results. However no significant difference was found between probing depth and psychological stress.

Conclusion: Result from the present study indicates that psychological variables related to stress susceptibility and current level of stress do not contribute to significant difference in clinical parameters of probing depth. Moreover, the results indicate that only stressful situations and their subjective impact have a significant correlation with gingival inflammation.

Keywords: Stress, Periodontal Disease, Gingival Inflammation, Questionnaire Study.

Introduction

Chronic Periodontitis has been defined as an "infectious disease resulting in inflammation within the supporting tissues of the teeth, progressive attachment loss and bone loss.[1] It occurs as a result of a local bacterial infection by a pathogenic micro-flora within the periodontal pocket.[2] The etiology and pathogenesis of periodontal disease are multi-factorial.[3] In addition to numerous risk factors, like uncontrolled diabetes mellitus, smoking, specific infections, age, psychological stress and certain psychosomatic conditions like anxiety and depression have been implicated.[4]

Research has also suggested that stress,

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depression, and ineffective coping may contribute to the development of periodontitis.[5] However, the mechanism by which stress affects periodontal health remains unclear. One model proposes that psychologic stress may result in immunologic and inflammatory responses that influence periodontal disease, whereas an alternative model hypothesizes that negative affective states may reduce compliance with preventive behaviors.[6] Evaluation of these potential mechanisms may help in the treatment for patients with stress or depression and periodontal disease.

Another mechanism by which psychologic factors may be associated with periodontal destruction is through alterations in behavior. Stress and depression increase at-risk health behaviors. For example, individuals experiencing stress or depression may smoke more frequently, neglect oral hygiene, or reduce compliance with dental care. Stress and depression may also result in dietary changes that cause immunosuppressant and heightened cortisol production.[7]

Over recent years several groups have discussed the hypothesis that psychological stress might be a risk factor for periodontitis.[8] Some correlation studies show a positive relationship between psychological stress assessed by means of questionnaires and several measures of periodontal diseases.[9]

Numerous questionnaires have been used to evaluate stress in previous studies Ministry of social Security; National Solidarity & Reform Institutions developed a questionnaire to evaluate academic stress in students.[10] This also helps to categorize the stress level in students as low, medium and high.

The aim of the present experimental study was to assess the effect of questionnaire based stress assessment on the gingival and periodontal health. In particular the impact of academic stress on gingival and periodontal health were comparatively analysed by psychological measures and clinical parameters.

Materials and Method

A total of 104 exam going students of both genders aged between 18 to 35 years were selected from I.T.S Dental College, Muradnagar, Ghaziabad. The study was conducted on September 2013 and commenced on October 2013.The nature and design of the study was explained to all the participants and within consent was obtained prior to the commencement of the study. A detailed Institutional Ethical Committee Approval was taken before the start of the study.

The subjects included in the study were those with good general health, who had not been treated with antibiotic therapy in the past 3 months and those without any history of systemic diseases. While the subjects who were excluded from the study included those with a history of self-reported psychiatric disorders and use of psychotropic medication, those who had received oral prophylaxis or had undergone any periodontal treatment in previous 6 months, those with current dental or orthodontic treatment and smokers.

Psychological Measures

All subjects were asked to complete series of 20 sets of psychological questions which were completed in the private setting in the clinic. These psychological questionnaires (Ministry of social security, National Solidarity & Reforms Institutions) aimed to evaluate stress in exam going students. Subjects were assured that their answers would be held in the strictest confidence to help encourage

complete and truthful self- reporting. (Table 1) Each question had 5 options (Never , Rarely , Sometimes , Often and very Often.) and each question was scored from 0 – 4, i.e. 0 for Never , 1 for Sometimes and so on.

The total stress score was calculated by adding the individual scores and students were categorized as those with No stress (Scores 0-20), Low stress (Scores 21-40), Medium Stress (Scores 41-60) and High Stress (Scores 61-80).

Clinical parameters

After completing the questionnaire, the students were subjected to clinical examination. Gingival index and pocket probing depth were measured and recorded at four sites per tooth, using William′s periodontal probe and UNC15 probe (University of North Carolina) respectively. The pocket probing depth measurements were made from free gingival margin to the base of the sulcus. The gingival index was assessed by using Loe and Sillness gingival index.[10]

Statistical Analysis

Statistical analysis was done using SPSS (Statistical package for social sciences) version 15.0 statistical analysis software. The values were represented (number %) and mean ± SD were calculated. Statistical tests of ANOVA (analysis of variance) and post Hoc bonferroni (Multiple comparison) were applied to compare and evaluate the results.

Results were analysed using ANOVA (analysis of variance) which showed that changes in gingival index scores between the three groups were found to be significant ($p < 0.05$ at 95% confidence interval) where as changes in the probing depth showed insignificant results ($p > 0.05$)

ANNEXURES

TABLE 1 Questionnaires (Ministry of social security, National Solidarity & Reforms Institutions)

STRESS QUESTIONNAIRE FOR STUDENTS
1. I cannot pay attention in the class.
2. I do not understand what my teacher teaches.
3. I am not sure if I am able to do well in school.
4. My attendance is poor.
5. I am often late in class.
6. I have too many assignment
7. I feel there is too much to do with tuition and home work.
8. I do not get enough pocket money.
9. I do not have enough money to pay my basic expenses
10. My parents control how much money i spend.
11. I have trouble getting along with my family members.
12. I have no friends/ I feel lonely.
13. I feel insecure because of too much competition in getting grades and a good job
14. I feel I am left with hardly any time for exercise
15. I have gained / lost weight
16. I am tired sleeping more / less than normal.
17. I feel sad and depressed.
18. I feel nobody cares for me.
19. I feel have I too much pressure because of my studies and examinations
20. I no longer do things once I very much liked to do

Result

A total of 104 exam going students (40 males and 65 females) were examined. The psychological questionnaires (Ministry of social security, National Solidarity &Reforms Institutions) used for stress evaluation is a 20 item Likert 3 point scale with a minimum score of 20 and maximum score of 60. Scores were categorized as those with 0- 20 points as being person with no stress at all;(21-40) points meant good management of stress; the person in danger zone included those with a score of(41-60) and finally a score of 61-80 included acutely stressed requiring counseling. Based on the above interpretation of the stress the students were graded in following stress groups: No stress (Score0-20), Low stress (Scores 21-40), Medium Stress (Scores 41-60) and High Stress (Scores 61-80).In our study, we found that 20 students were under no stress, 75 had low stress levels and 12 students were under medium stress. None of the subjects scored High Stress. Only the first three groups were used for final analysis as described below. There were no gender differences in the level of stress expressed.

Graph 1, Table 2 shows gingival index scores and its relationship with stress levels. It was found that gingival inflammation increased with increasing stress levels. The gingival index in medium stress group was 1.2± 0.2 as compared to 0.46± 0.4 in the no stress group. This difference between the groups was found to be significant.

Mean Probing depth also increased from no stress group to the medium stress group i.e from 1.68±0.2 to 1.90±0.3 which was statistically non significant.

On applying ANOVA with Post Hoc test (multiple comparisons) significant changes were observed in the gingival index scores between groups with no stress and low stress and no stress and medium stress groups ($p<0.05$) but insignificant results were found when probing depth was compared between the three groups.

GRAPH 1: Graph showing effects of stress on gingival index and probing depth.

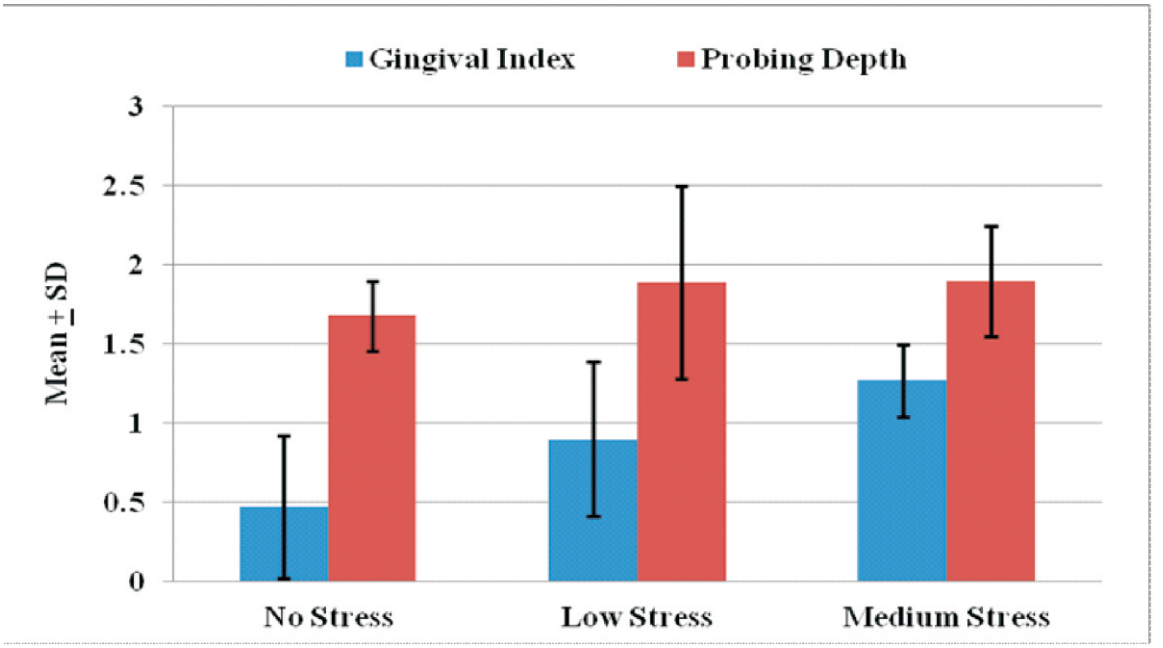

TABLE 2: Comparison of Clinical parameters among various groups (p<0.05)

CLINICAL PARAMETERS	GROUPS			P VALUE
	No stress stress	Low stress	Medium	
GI	0.46±0.4	0.89± 0.4	1.2±0.2	<0.05
PD	1.68±0.2	1.89±0.6	1.90±0.3	= 0.54

TABLE 3: Post Hoc Multiple Comparisons tests with clinical parameters among the groups (p<0.05)

Dependent Variable	Stress Groups INTERPRET	INTERPRET	Mean Difference	Std. Error	Sig.
GI	No stress	Low Stress	-.42811*	.16535	.038
		Medium Stress	-.79867*	.23886	.005
	Low stress	No Stress	.42811*	.16535	.038
		Medium Stress	-.37056	.20397	.226
	Medium stress	No Stress	.79867*	.23886	.005
		Low Stress	.37056	.20397	.226
PD	No stress	Low Stress	-.20600	.19051	.855
		Medium Stress	-.21933	.27521	1.000
	Low stress	No Stress	.20600	.19051	.855
		Medium Stress	-.01333	.23501	1.000
	Medium stress	No Stress	.21933	.27521	1.000
		Low Stress	.01333	.23501	1.000

Discussion

The aim of the present study was to assess the effect of questionnaire based stress assessment on the gingival and periodontal health. Stress is an ambivalent concept. It is a state of physiological or psychological strain caused by adverse stimuli, physical, mental or emotional, internal or external, that tend to disturb the functioning of an organism and is avoided by the organism.[11]

The result of this study involving 104 subjects has shown an association between

psychological stress with periodontal health. Academic stress was associated with an increase of plaque accumulation. Thus increasing the risk of plaque- associated disease. The particular age group (18 to 35 years) was selected because the students are more prone to psychological stress during their exams.

Stress can negatively influence the oral health status of an individual, which can lead to increased amounts of dental plaque, gingival inflammation and more severe periodontitis.[12] [13]Psychological stress was also shown to be related to periodontitis through changes in behavior, immunologic and inflammatory response.[14]

This could be due to deregulation of the immune system, mediated through the hypothalamic–pituitary–adrenal and sympathetic– adrenal medullary axis.[15].The activation of this by means of stress might result in the release of an increased concentration of the corticotropin-releasing hormone from the hypothalamus which may act on the anterior pituitary thereby resulting in the release of the adrenocorticotropic hormone (corticotropin). The corticotropin may then act on the adrenal cortex enhancing the production and release of cortisol into the circulation, leading to suppression of the inflammatory response, modifying cytokine profiles, elevation of blood glucose levels and alteration of certain growth factor levels.[16 17]

According to a study done by Denzier et al, exam going students also reported on neglect of oral hygiene during the exam period and this neglect seemed to affect thoroughness rather than frequency of oral hygiene.[18]

In our study gingival index increased with increase in the stress among the exam going students. However probing depth did not show any significant increase. The increase in gingival inflammation can also be explained by the direct influence of stress on the immune system through plaque accumulation leading to increased susceptibility to periodontal diseases.[19]

Green et al reported more periodontal disease in those with more life-events stress and a particularly strong correlation between stressors and periodontal disease in patients who also reported somatization.[20] In addition to life events, occupational and academic stress may be associated with the progression of periodontal disease.[7]

Thus the results in the present study indicate that only stressful situations and their subjective impact have a significant correlation with periodontal health in an individual.

Conclusion

Academic stress appears to affect periodontal health shown by more plaque accumulation, gingival inflammation, clinical attachment loss and increased levels of cytokines and cortisol in saliva. The significant change in the clinical data states strong interrelationship between stress and periodontal disease. From a clinical point of view, we recommend that the patients should be informed about Stress as a risk factor for periodontal diseases. In case a patient is not able to maintain oral hygiene, professional help should be rendered at short recall intervals especially during times of enhanced psychological strain.

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