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To Evaluate the Relation Between Psychological Stress and Periodontal Health in Traffic Police of Ahmedabad City: A Cross Sectional Study

Mahendra Katariya[1*] Bela Dave[2] Viral Thakker[3] Nancy Joshi[4] Anuja Dave[5] Heena Narsinghani[6]

[1]PG Student, Department of Periodontology, AMC Dental College and Hospital, Ahmedabad, Gujarat, India.
[2]Professor and Head, Department of Periodontology, AMC Dental College and Hospital, Ahmedabad, Gujarat, India.
[3]Reader and PG Guide, Department of Periodontology, AMC Dental College and Hospital, Ahmedabad, Gujarat, India.
[4]PG Student, Department of Periodontology, AMC Dental College and Hospital, Ahmedabad, Gujarat, India.
[5]PG Student, Department of Periodontology, AMC Dental College and Hospital, Ahmedabad, Gujarat, India.
[6]PG Student, Department of Periodontology, AMC Dental College and Hospital, Ahmedabad, Gujarat, India.

ABSTRACT

Aim: The aim of this study was to evaluate the relation between psychological stress and periodontal health in traffic police of six different zones of Ahmedabad city.

Materials and method: A cross-sectional study was conducted amongst 240 traffic police participants of six different zones of Ahmedabad city between November 2019 to January 2020. A printed self-explanatory questionnaire after informed consent was filled by the participants between the age group of 25-50 years. periodontal status was assessed with CPITN index and stress was assessed using perceived stress scale by the investigator. The collected data was analysed by using SPSS 20 software. Statistical analysis was done using Chi Square test for categorical data and ANOVA for quantitative data considering probability levels of $P < 0.05$ statistically significant.

Results: Out of 240 participants, 45.83% were tobacco chewers, pan masala chewers 35.41% and smokers 31.25%. When assessed, 34.58% participants were stressed, out of which 91.25% had periodontal disease. Direct correlation was seen between perceived stress scale and periodontal status of the participants.

Conclusion: The present survey concluded that stress can have a direct deleterious effect on periodontal health. Hence, for evaluating the risk of chronic periodontitis, assessing patients for stress is an essential factor.

Keywords: Survey, psychological stress, periodontal health, traffic police, Ahmedabad.

INTRODUCTION

Periodontitis is a chronic inflammatory disease characterized by episodes of active destruction to pronounced inflammatory infiltration, attachment loss, and alveolar bone loss. The mechanisms underlying this destructive process involve both direct tissue damage resulting from bacterial products and indirect damage through bacterial induction of the host inflammatory and immune responses.[1]

Systemic diseases and conditions such as diabetes mellitus, aging, tobacco use, stress have been identified as important risk factors for periodontitis. Psychosocial stress is thought to play an important role in the etiology and progression of periodontal diseases, and the outcome of treatment[2] . The relationship between periodontitis and several dimensions of psychosocial distress such as stress, depression, anxiety, life events and poor coping

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*Correspondence Dr. Mahendra Katariya.
Department of Periodontology, AMC Dental College and Hospital, Ahmedabad, Gujarat, India.
Email: mr.katariya1@gmail.com

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reactions has attracted considerable attention from several groups of researchers during the last three decades.[3]

Studies have shown a strong relationship between periodontal diseases and psychological factors such as stress, distress, anxiety, depression and loneliness . The factors responsible for such an association could be due to psychologically induced modulation of the immune system, leading to increased blood levels of adrenocorticotropic hormones, alteration of crevicular cytokine levels, depressed polymorphonuclear leukocyte chemotaxis and phagocytosis, reduced proliferation of lymphocytes, changes in blood circulation and healing, modifications of the salivary flow and its components and endocrine changes leading to immunosuppression.[4]

The behavioral mechanism of stress could also have an indirect effect on periodontal health through the life style changes such as smoking and drinking, an unhealthy diet and neglect of oral hygiene, leading to decreased host response and an increased risk for severe periodontal disease.[5]

The biological mechanism emphasizes the mechanism by which stress and depression could reduce immune system function and cause chronic inflammation. As a result of stressful events, stimulation of the hypothalamus-pituitary-adrenal (HPA) axis leads to the secretion of corticotropin-releasing hormone from the pituitary gland and cortisol, a glucocorticoid hormone, from the adrenal cortex. This action is capable of reducing immune responses by inhibiting the functions of lymphocytes, macrophages and monocytes, thereby increasing the susceptibility of individuals to infection.[6]

The biological mechanism involves the autonomous nervous system (ANS) which, when stimulated by adrenergic receptors, leads to secretion of catecholamines (adrenaline/noradrenaline) (CAs), neuropeptides such as substance P (SP) and chromogranin A (CgA) by the adrenal medulla, thereby indirectly provoking periodontal tissue breakdown. Catecholamines regulate the immune response by stimulation of immune cell propagation and activity, whereas CgA have antimicrobial effects.[7]

The autonomous nervous system acts on the salivary glands during stress by secreting enzymes such as salivary alpha-amylase (SAA), which acts by neutralizing and preventing pathogens from entering the body via the mucosal surfaces and inhibiting the adherence and growth of bacteria in the oral cavity. Increased production of pro-inflammatory cytokines and interleukin-6 was reported in response to psychological stress, which leads to sustained inflammatory destruction within the periodontium.[8]

Various studies have shown harmful effects of stress on periodontal health. Individuals working as traffic police tend to be under stress due to hectic duty and longer duration of working hours. In our literature search we came across not a single study where such relationship with target population is studied. So, the present study was done to evaluate the periodontal status and to identify if relation does exist between stress and periodontal health in traffic police population.

MATERIALS AND METHOD

After Ethical clearance was obtained from the Institutional Review Board committee and ATCC, the proposed study was conducted in traffic police population at six different zones of Ahmedabad city, Gujarat, over a period of 2 months. All the participants between the age of 25-50 years who were willing to give informed consent and permitted examination of oral cavity were included. A self-explanatory questionnaire of 15 MCQs was prepared and distributed to the participants. Questionnaire was prepared both in English and Gujarati (local language) to get better understanding of questions by the participants. Perceived stress scale, periodontal status of participant and clinical parameters were done by one principal investigator only. After screening, oral hygiene instructions were given and treatment planning was explained to each and every individual.

Screening examination

Participants were asked about the basic demographic details including age, past medical and dental history, frequency of brushing. Also, presence of any adverse habit like tobacco, smoking or any other parafunctional habits were 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.[9] Periodontal status was assessed using CPITN index by *Jukka Ainamo et al* 1982.

Questionnaire

Participant's Name: _____

Age: _____

Sex: _____

Date: _____

1. Duration of job as a traffic police since:

☐ 0-5 years

☐ 6-10 years

☐ 11-15 years

☐ >15 years

2. What are your regular working hours / week?

☐ <50 hours

☐ 50-70 hours

☐ 71-90 hours

☐ >90 hours

3. How frequently do you get night duties / week?

☐ 2 times

☐ 4 times

☐ 6 times

☐ Never

4. Do you have habit of tobacco chewing?

☐ Yes

☐ No

5. If yes then what is the frequency of it?

☐ once a day

☐ twice a day

☐ more than twice a day

6. Do you have habit of pan masala chewing?

☐ Yes

☐ No

7. If yes then what is the frequency of it?

☐ once a day

☐ twice a day

☐ more than twice a day

8. Do you have habit of smoking?

☐ Yes

☐ No

9.If yes then what is the frequency of it?

☐ once a day

☐ twice a day

☐ more than twice a day

10. Do you get threat from the public?

☐ Regularly

☐ Often

☐ Seldom

☐ Never

11. Do you have any systemic disease?

☐ Diabetes

☐ Hypertension

☐ TB

☐ Asthma

☐ none

☐ Any other

12. Do you have habit of clenching teeth at night?

☐ Yes

☐ No

☐ Not aware

13. Do you have any gum problems?

☐ bleeding gums

☐ Swollen gums

☐ Foul smell

☐ None

14. Do you have any loose teeth?

☐ Yes

☐ No

☐ Not aware

15. Do you feel your teeth have worn off?

☐ Yes

☐ No

☐ Not aware

Statistical Analysis

The Collected data was entered in Microsoft excel (2010) spreadsheet. Appropriate descriptive statistical test were computed and statistical analysis was done. The collected data was analysed by using IBM SPSS version 20. Statistical analysis was done using Chi Square test for categorical data and ANOVA for quantitative data. For all statistical analysis, probability levels of $P < 0.05$ was considered statistically significant.

RESULTS

Out of 240 total participants (40 participants in each six zones), 23 (57.5%) in Central Zone, 20 (50%) in East Zone, 24 (60%) in North Zone, 22 (55%) in New West Zone, 31 (77.5%) in South Zone, 21 (52.5%) in West zone had <50 regular working hours per week. (Table 1)

Table 1: Zone wise working hours of individuals.

		Central (n=40)	East (n=40)	North (n=40)	New West(n=40)	South (n=40)	West (n=40)	Total (n=240)
What are your regular working hours per week	<50	23	20	24	22	31	21	141
	50-70	14	13	9	11	7	14	68
	71-90	3	7	7	7	2	5	31
	>90	0	0	0	0	0	0	0

Out of total 240 participants, 45.83% were tobacco chewers, 35.41% were pan masala chewers and 31.25% were smokers. (Figure 1)

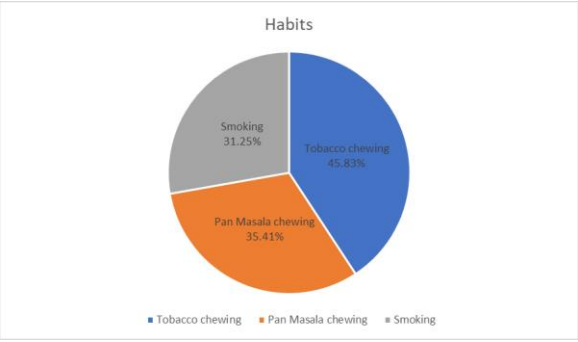

Fig 1: Percentage distribution of different habits of individuals.

When question about gum problems was asked, participants with bleeding gums were 11 (27.5%) in Central zone, 17 (42.5%) in East Zone, 12 (30%) in North Zone, 13 (32.5%) in New West Zone, 13 (32.5%) in South Zone, 12 (30%) in West zone; participants with swollen gums were 3 (7.5%) in Central zone, 2 (5%) in East Zone, 2 (5%) in North Zone, 3 (7.5%) in New West Zone, 2 (5%) in South Zone, 4 (10%) in West zone; participants with foul smell were 6 (15%) in Central zone, 4 (10%) in East Zone, 5 (12.5%) in North Zone, 6 (15%) in New West Zone, 6 (15%) in South Zone, 9 (22.5%) in West zone. (Table 2)

Table 2: Zone wise periodontal / Gingival problems of individuals.

Do you have any gum problems	Zone						Total (n=240)
	Central (n=40)	East (n=40)	North (n=40)	New West (n=40)	South (n=40)	West (n=40)	
bleeding gums	11	17	12	13	13	12	78
Swollen gums	3	2	2	3	2	4	16
Foul smell	6	4	5	6	6	9	36
None	20	17	21	18	19	15	110

When question was asked about habit of clenching teeth at night, 7 (17.5%) participants in Central zone, 0 (0%) in East Zone, 2 (5%) in North Zone, 4 (10%) in New West Zone, 2 (5%) in South Zone, 3 (7.5%) in West zone, had the habit of clenching teeth at night. Rest participants were either unaware or did not have the habit. (Table 3)

Table 3: Zone wise parafunctional habit of individuals.

Do you have habit of clenching teeth at night	Zone						Total (n=240)
	Central (n=40)	East (n=40)	North (n=40)	New West (n=40)	South (n=40)	West (n=40)	
Yes	7	0	2	4	2	3	18
No	24	31	29	25	32	26	167
Not Aware	9	9	9	11	6	11	55

When Perceived Stress Scale was measured, 14% participants in Central zone, 35% in East Zone, 28% in North Zone, 42.5% in New West Zone, 22.5% in South Zone, 48% in West zone were found to be under psychological stress. (Figure 2)

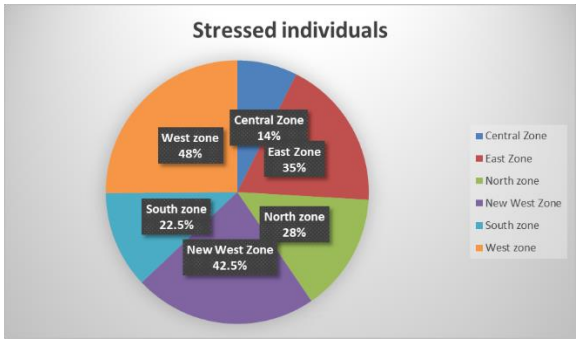

Fig 2: Stressed individuals among different zones.

When checked for participants with both stress and periodontal disease, it was found that in both stress and periodontal disease were highest in West zone (48% stress, 50% periodontal disease) followed by New West zone (42.5% stress, 35% periodontal disease) and least in South zone (22.5% stress, 17.5% periodontal disease). (Figure 3)

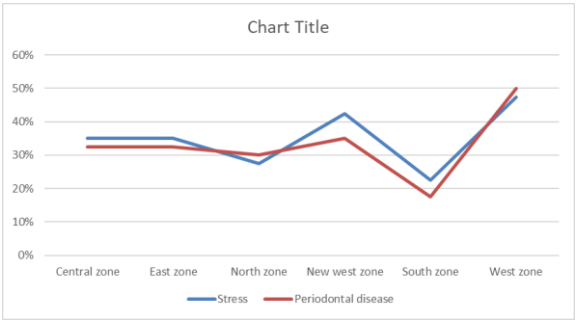

Fig 3: Relation between stress and periodontal disease.

When assessing the correlation between stress and periodontal disease, statistically significant results were found in all the groups ($p<0.05$) with correlation coefficient values of 0.936 in Central zone, 0.945 in East zone, 0.923 in North zone, 0.867 in New West zone, 0.778 in South zone, 0.918 in West zone. (Table 4)

Table 4: Zone wise intergroup analysis.

Zone	PSS		CPI		r	P value
	Mean	SD	Mean	SD		
Central (n=40)	18.05	6.53	2.15	1.05	0.936	0.000
East (n=40)	17.43	7.22	2.13	1.20	0.945	0.000
North (n=40)	15.73	6.19	1.98	1.16	0.923	0.000
New West (n=40)	18.90	7.07	2.20	1.14	0.867	0.000
South (n=40)	15.95	4.57	1.85	0.95	0.778	0.000
West (n=40)	19.83	6.82	2.38	1.23	0.918	0.000
Total (n=240)	17.65	6.57	2.11	1.23	0.899	0.000
Kruskal Wallis Test (P Value)	0.038		0.478			

r=correlation coefficient

DISCUSSION

Investigations promoting the recognition of risk factors are acquiring essence for management and prevention for periodontitis as it is a multifactorial disease. It is recommended that stress, depression, and unsuccessful coping may add to the progression of periodontitis.[10]

The periodontal breakdown is promoted, as persistent stress may tend to have a total destructive effect on the immunological response of body leading to a disparity between host response and pathogens.[11] Numerous clinical studies have investigated the probable relationship between psychological stress and periodontitis and have recommended that stress may play a role in the advancement of periodontal disease.[12-15]

In present study, the relationship between stress and periodontal disease had been evaluated in traffic police using perceived stress scale by Sheldon Cohen in 1994.[9] 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 levels, 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.[16-19]

Studies done in past by Moss et al in 1996[20], Genco et al in 1999[21], hugoson et al in 2002[22], Sabbah et al in 2011[23] all showed positive correlation between psychological stress and periodontitis. Recently, Refulio et al[24], 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 al[25], Castro et al[26], Mengel et al[27], Vedhera et al[28] with different psychological scale showed no positive co relation between stress and periodontal disease.

In the present study, statistically significant difference was found between periodontal status of individuals who were stressed and also were tobacco chewers (smoke and smokeless forms) as compared to stressed individuals with no oral destructive habits followed by non-stressed individuals.

When assessed for participants with both stress and periodontal disease, it was found that both stress and periodontal disease were highest in West zone (47.5% stress, 50% periodontal disease) followed by New West zone (42.5% stress, 35% periodontal disease) and least in South zone (22.5% stress, 17.5% periodontal disease). This may be due to longer duration of working hours in these highly developed zones.

Traffic police tend to be under higher stress due to their duties of longer duration. Due to that ,they are

more inclined towards having oral destructive habits which ultimately lead to compromised periodontal status. This is in accordance with the behavioural model signifying that psychosocial stress may impact behavioural changes affecting health behaviours (i.e. smoking, poor compliance, and poor oral hygiene). However, in literature, no such study has been found comparing effects of stress on periodontal disease in individuals working as traffic police.

Within the limitations of this study, it was concluded that there was significant difference in the frequency distribution of periodontitis between stressed and non-stressed individuals and also those with longer durations of duty as traffic police. In addition, the clinical parameters suggest predilection of periodontal disease toward stress.

CONCLUSION

The present survey with limited sample size concluded that stress can have a direct deleterious effect on periodontal health. However, further research in this field is needed in future for better knowledge and awareness of the effects of stress on periodontal health in individuals with different occupation.

CONFLICTS OF INTEREST

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

REFERENCES

[1] LeResche L, Dworkin SF : The role of stress in inflammatory disease, including periodontal disease: review of concepts and current findings J. Periodontology 2002 30: 91-103.

[2] Bruno, Bagga brunette, Stress may enhance nicotine effects on periodontal tissues. An in vivo study in rat, J of periodontal research, April 2003

[3] Daiane C. Peruzzo, Bruno B. Benatti, A Systematic Review of Stress and Psychological Factors as Possible Risk Factors for Periodontal DiseaseJ Periodontol August 2007

[4] Mannem S, Chava VK. The effect of stress on periodontitis: A clinicobiochemical study.J Indian Soc Periodontol. 2012 Jul;16(3):365-9.

[5] Sachin Goyal, Garima Gupta,1 Betsy Thomas, Stress and periodontal disease: The link and logic Ind psychiatry journal; Jan-Jun 2013PMC3895311

[6] Christian R. Salazar,The role of stress in periodontal disease progression in older adult,J Indian Soc Periodontol.. 2013 Nov; 1(11): 15–26.

[7] Jaiswal R1, Shenoy N1, Thomas B ,Evaluation of association between psychological stress and serum cortisol levels in patients with chronic periodontitis - Estimation of relationship between psychological stress and periodontal status. J Indian Soc Periodontol. 2016 Jul-Aug;20(4):381-385

[8] Hassan S Halawany, Nimmi B Abraham, Vimal Jacob:Is Psychological Stress a Possible Risk Factor for Periodontal Disease? A Systematic Review J Psychiatry 2018:217

[9] Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress.J Health Soc Behav 1983;24(4):385-396.

[10] Rosania AE, Low KG, McCormick CM, Rosania DA. Stress, depression, cortisol, and periodontal disease. J Periodontol 2009;80:260-6.

[11] Green LW, Tryon WW, Marks B, Huryn J. Periodontal disease as a function of life events stress. J Human Stress 1986;12:32-6.

[12] Page RC. The pathobiology of periodontal diseases may affect systemic diseases: Inversion of a paradigm. Ann Periodontol 1998;3:108-20.

[13] Elter JR, Beck JD, Slade GD, Offenbacher S. Etiologic models for incident periodontal attachment loss in older adults. J Clin Periodontol 1999;26:113-23.

[14] Vered Y, Soskolne V, Zini A, Livny A, Sgan-Cohen HD. Psychological distress and social support are determinants of changing oral health status among an immigrant population from Ethiopia. Community Dent Oral Epidemiol 2011;39:145-53.

[15] Jalaleddin H, Kakaei S, Hamissi H. Psychological stress and periodontal disease. Pak Oral Dent J 2010;30:464-7.

[16] Habib KE, Gold PW, Chrousos GP. Neuroendocrinology of stress. Endocrinol Metab Clin North Am. 2001;30(3):695-728.

[17] Oken BS, Chamine I, Wakeland W. A systems approach to stress, stressors and resilience in humans.Behav Brain Res 2015;282(7):144-154.

[18] Lee KM, Kang D,Yoon K, et al. A pilot study on the association between job stress and repeated measures of immunological biomarkers in female nurses. Int Arch Occup Environ Health 2010;83(7):779-789.

[19] Padgett DA, Glaser R.How stress influences the immune response .Trends Immunol 2003;24(8):444-448.

[20] Moss E, Beck D,Kaplan H,Offenbacher S,Weintraub J, Matchei E et al.Exploratory case–control analysis of psychosocial factors and adult periodontitis.J of Periodontol 1996;67:1060–1069

[21] Genco J,Ho W, Grossi G,Dunford G,Tedesco A.Relationship of stress, distress, and inadequate coping behaviors to periodontal disease. J of Periodontal 1999;70:711–723.

[22] Hugoson A,.The relationship of some negative events and psychological factors to periodontal disease in an adult swedish population 50 to 80 years of age.J of Clin periodontal 2002; 29:247-253.

[23] Sabbah W,Tsakos G, Chandola T, Newton T,kawachi I,Sheiham A et al.The relationship between social network,social support and periodontal disease among older americans.J of Clin periodontal 2011 Jun; 38:547-552.

[24] Refulio Z . Association among stress, salivary cortisol levels, and chronic periodontitis. J Periodontal Implant Sci 2013 Apr; 43(2): 96–100.

[25] Solis AC, Lotufo RF, Pannuti CM, Brunheiro EC, Marques AH, Lotufo-Neto F. Association of periodontal disease to anxiety and depression symptoms, and psychosocial stress factors. J Clin Periodontol 2004;31:633-8.

[26] Castro GD, Oppermann RV, Haas AN, Winter R, Alchieri JC. Association between psychosocial factors and periodontitis: A case-control study. J Clin Periodontol 2006;33:109-14.

[27] Mengel R, Bacher M, Jacoby L. Interactions between stress, interleukin-1beta, interleukin-6 and cortisol in periodontally diseased patients. J Clin Periodontol 2002;29:1012-22.

[28] Vedhara K, Miles J, Bennett P, Plummer S, Tallon D, Brooks E et al. An investigation into the relationship between salivary cortisol, stress, anxiety and depression. Biol Psychol 2003;62:89-96.