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Association between psychosocial factors and periodontitis: a case–control study

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Abstract

Objective: This case-control study investigated the association between life events, anxiety, and depression with periodontitis.

Methodology: The study counted with 165 individuals, both sexes, 35–60 years of age. Case group included 96 individuals suffering from periodontal disease; and in control group 69 subjects with no history of periodontitis. Clinical examinations were performed by a single examiner. Psychological assessment included four inventories: Life Events Scale, Beck Anxiety Inventory, State-Trait Anxiety Inventory and Beck Depression Inventory. Bivariate and multivariate logistic regression analyses were performed to compare cases and controls.

Results: Mean probing depth and clinical attachment level were 3.44 ± 0.80 and 4.01 ± 1.61 in the case group and 1.96 ± 0.19 and 0.95 ± 0.50 in the control group, respectively (p < 0.05). Positive association of periodontitis with age (odds ratio (OR) = 1.15 95% confidence interval (CI): 1.06-1.24), male gender (OR = 2.71, CI: 1.13-6.49), smoking (OR = 6.05, CI: 1.67-21.94) and educational level (OR = 6.49, CI: 1.14-36.95) was confirmed. Bivariate analysis did not demonstrate significant mean differences in life events, anxiety symptoms, trait or state of anxiety, or depression symptoms between cases and controls. Multivariate logistic regression, controlling for confounding factors, demonstrated no significant association between psychosocial factors and periodontal disease.

Conclusions: Within the limits of this study it is possible to conclude that there was no significant association between periodontitis and the psychosocial factors analysed.

Several authors have shown interest in the study of the effects of psychosocial factors on the aetiology of periodontal diseases (Moss et al. 1996, Genco et al. 1998, Vettore et al. 2003). This is due mainly to two reasons: the fact that stress and/or depression affect a large section of the modern population and, on the other hand, the effect of mental and emotional conditions on the immune response of individuals, predisposing the emergence of several pathologies (Marucha et al. 1998, Ader et al. 2001). It is a known fact that bacteria are the aetiological agents of periodontal diseases, although the presence of bacteria itself is not capable of producing advanced tissue destruction in all individuals. This means that there is an individual response and adaptation ability to a certain amount of bacterial plaque without progression of the disease. Behavioural factors such as smoking, oral hygiene and stress, associated with social, economic and cultural condition, may alter the health balance favouring the onset of periodontal disease. All these factors act-

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ing together create favourable conditions for the development of the disease in the individual (Genco 1996, Rabin 1999).

One of the possible mechanisms of influence of stress and psychosocial factors on periodontal conditions is the modification of patients' health behaviour. Individuals with high stress levels tend to adopt habits which are harmful to periodontal health, such as negligent oral hygiene, intensification of smoking or changes in eating habits with negative reflexes to immunological system functions (Genco et al. 1998).

Another mechanism that can modify the extension or severity of periodontitis is based on the neuro-immuneendocrine interaction by the action of hormones and chemical mediators produced by the organism in situations of stress or anxiety in order to coordinate the fight or flight response (Genco et al. 1998, Rabin 1999). Glucocorticoids released into the cortex of the suprarenals can induce the reduction of pro-inflammatory cytokines secretion (interleukins, prostaglandines and tumour necrosis factor). On the other hand, catecholamines (epinephrine and norepinephrine) have the opposite effect, stimulating the formation and activity of prostaglandines and proteolytic enzymes, which can indirectly provoke tissue destruction (Genco et al. 1998, Breivik & Thrane 2001).

Based on these evidences, this study investigated the association of stress (measured as life events), anxiety and depression with periodontal disease in adult patients.

Methodology

Sample selection

This study was conducted as a casecontrol study. The selected sample involved 169 adults from the periodontal and restorative clinics of the Faculty of Dentistry at the Federal University of Rio Grande do Sul (UFRGS), in Porto Alegre, South Brazil. This study was submitted and approved by the Research Ethics Committee of the Faculty of Dentistry. All individuals signed an informed consent before taking part in the study.

Ninety-six individuals were selected in the case group (58.18%) and 69 in the control group (41.82%). Case subjects were defined as individuals between 35 and 60 years of age, presenting at least 20 teeth, and having advanced periodontal disease, characterized as clinical attachment level (CAL) \geq 4 mm and bleeding on probing (BOP) in at least 10 teeth, and probing pocket depth $(PPD) \ge 6 \text{ mm}$ in at least five teeth. These criteria were used as they represent the profile of patients looking for periodontal treatment at the Periodontal Department of the Faculty of Dentistry. Control subjects (35-60 years of age) should present at least 20 teeth with CAL or PPD $\leq 3 \text{ mm}$ and should not have more than eight sites with CAL or PPD = 4 mm. These patients should not have received previous periodontal treatment neither should be in need of it. Patients under antibiotic, anti-inflammatory, and anti-depressive medication as well as those presenting systemic conditions such as diabetes were not admitted in the study. Pregnant women, patients in need of antibiotic prophylaxis and patients wearing orthodontic appliances were not included. In order to observe the final sample size, over than 1000 patients were examined in a 1-year period.

Ninety-six individuals were selected for the case group (58%) and 69 for the control group (42%). The sample size was different between case and control groups because of difficulty to find periodontally healthy individuals on the Faculty of Dentistry presenting the inclusion criteria. Assuming these numbers of subjects included in the study groups and a prevalence of depression of 20% in the target population, a difference of 22% in the prevalence of depression between cases and controls would be checked with a power of 80% and an α level of 5%.

Clinical measurements

PPD, CAL and BOP were assessed at six sites per tooth (mesiobuccal, buccal, distobuccal, mesiolingual, lingual and distolingual) of all erupted teeth, using a manual periodontal probe (CP10SE, Hu-Friedy, Chicago, IL, USA). Assessments were performed by one single calibrated examiner. The intra-examiner reproducibility was assessed through duplicate measurements of 10 individuals. During the study, measurements were repeated in six individuals. Weighted κ coefficients ranged between 0.86 and 0.91.

Psychosocial measurements

In order to assess stress, anxiety and depression, subjects had to answer to four tests, assisted by a Psychology student trained and supervised by a professional of the field.

Beck Anxiety Inventory (BAI), Portuguese version (Cunha 2001): selfreport scale consisted of 21 items, or descriptive statements of anxiety symptoms rated by the subject on a four-point scale. The total score allows a classification of anxiety intensity levels: 0–10 minimum; 11–19 mild; 20–30 moderate and 31–63 severe. Beck Depression Inventory (BDI), Portuguese version (Cunha 2001): selfreport scale consisting of 21 items with four alternatives each, arranged in increasing degrees of depression severity. The intensity of depression of the Brazilian population corresponds to the following scores: 0–11 minimum depression; 12–19 mild; 20–35 moderate and 36–63 severe.

State-Trait Anxiety Inventory (STAI), adapted by Biaggio et al. (1977) for the Brazilian population: two scales for measuring characteristics of anxiety states and traits, respectively. A trait refers to an individual who is relatively stable but has a predisposition for anxiety, and it describes the way the subject generally feels; while a state refers to a transitory emotional state that may vary in intensity and fluctuate with time. Each scale consists of 20 items with four alternatives each, with values ranging from 20 to 80 for each scale without established categories.

Life Events Scale (LES), adapted by Savoia (1995): scale to measure life events, as well as the impact of these events on individual's life during the past 12 months. This scale consists of a list of 26 events, from which the subjects indicate those that occurred during the previous year, mentioning the impact they had on their lives: positive, neutral or negative. The total result of events is obtained by the sum of the chosen items; and the impact of the events is assessed by the difference between positive, neutral and negative ones.

Data analysis

Age, brushing frequency, PPD, CAL, BOP, BAI, BDI, STAI, positive, negative and total life events, as well as the impact of events, were expressed by means and standard deviations, compared between groups were performed using paired *t*-test.

Gender, educational level, income, civil status, smoking and insomnia were presented by frequency distribution and compared between groups using the χ^2 test.

Bivariate logistic regression models were applied to detect variables associated to the clinical outcome. Those showing significant association (p < 0.05) were fitted in a multivariate regression model. The association between periodontitis and risk indicators was expressed by odds ratios (ORS) and their respective 95% confidence intervals (95% CI).

An analysis was also carried out between groups of non-smokers only. The individual was considered the analytical unit and the significance level was set in 5%.

Results

Tables 1 and 2 show the sample description, the mean scores of clinical and demographic parameters and respective standard deviations. There was a statistically significant difference between groups in all clinical parameters evaluated (p < 0.001) (Table 1).

Regarding to gender, there was a higher proportion of males in the case group and a higher proportion of females in the control group, with statistically significant differences between groups (p < 0.05). Mean age in case and control groups, were 45.65 ± 6.23 and 41.69 ± 5.13 , respectively, with statistically significant difference between them (p < 0.05) (Table 2).

Smoking status and educational level were also statistically different between groups. The distribution of current smokers, former smokers and non-smokers was 24, 23 and 49 in cases; and 8, 5 and 56 in controls, respectively (p < 0.05). Regarding to educational level, a higher proportion of individuals with incomplete elementary education was observed in the case group, while in the control group there was a higher percentage of individuals with an university degree (p < 0.05). Income, civil status, brushing frequency, and insomnia were not statistically different between groups (Table 2).

Analysis of a sub-sample of nonsmoking individuals was performed in order to exclude the smoking effect on the clinical outcome and to verify whether there was any interference in the psychosocial variables. This analysis on non-smokers showed similar results to those reported when all the subjects were evaluated.

Regarding to BAI, BDI and STAI scales, the groups were compared in relation to mean scores and standard deviations of each scale (Table 3). The control group showed slightly higher mean scores than the case group, yet without statistical significance (p > 0.05).

The total number of life events, as well as their magnitude (positive, negative and the difference of positive and negative) expressed by mean score and

Table 1. Clinical parameters in case and control groups (mean \pm standard deviation)

Clinical measurements	Cases $(N = 96)$	Control $(N = 69)$	p (paired t-test)
Probing pocket depth (mm) Clinical attachment level (mm) Bleeding on probing (%)	$\begin{array}{c} 3.44 \pm 0.80 \\ 4.01 \pm 1.61 \\ 45.09 \pm 17.93 \end{array}$	$\begin{array}{c} 1.96 \pm 0.19 \\ 0.95 \pm 0.50 \\ 13.20 \pm 8.69 \end{array}$	<0.001 <0.001 <0.001

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Characteristics	Case $(N = 96)$	Control $(N = 69)$	р
Age (mean \pm Standard Deviation)*	45.66 ± 6.23	41.70 ± 5.13	< 0.001
Gender $(\%)^{\dagger}$			
Male	50 (52.08)	21 (30.43)	0.007
Female	46 (47.91)	48 (69.56)	
Educational level (%) [†]			
Incomplete elementary school	30 (31.25)	6 (8.69)	
Elementary school	21 (21.88)	15 (21.74)	0.004
High school	36 (37.50)	37 (53.62)	
College	9 (9.37)	11 (15.94)	
Marital status (%) [†]			
Single	21 (21.88)	20 (28.99)	
Married	55 (57.30)	35 (50.72)	0.723
Divorced	16 (16.66)	12 (17.39)	
Widow	4 (4.16)	2 (2.90)	
Smoking status (%) [†]			
Non-smoker	49 (51.04)	56 (81.16)	
Former smoker	23 (23.96)	5 (7.25)	< 0.001
Current smoker	24 (25.00)	8 (11.59)	
Insomnia			
Present	21 (21.88)	15 (21.74)	
Absent	75 (78.12)	54 (78.26)	1.000
Income (minimum wage) [†]			
0–2	33 (34.37)	26 (37.68)	
2.1–4	37 (38.54)	16 (23.19)	0.087
4.1-6	15 (15.62)	13 (18.84)	
6.1–10	9 (9.37)	7 (10.14)	
More than 10 MW	2 (2.08)	7 (10.14)	
Toothbrushing frequency (times a day)	2.89 ± 0.87	2.66 ± 0.83	0.158

*Paired t-test.

 $^{\dagger}\chi^2$ test.

standard deviation were similar between groups without significant differences between them (Table 4).

Internal consistency of psychometric scales was evaluated by the Cronbach α , which verifies the confidence of the scale to maintain the original results. It was observed that all scales demonstrated a good reproducibility expressed by the α values above 0.8, which is considered satisfactory.

Logistic regression analysis was performed controlling for gender, age, educational level, income, and smoking status. For each of the scales (BAI, BDI, state and trait anxiety) a multivariate model was fitted to verify the risk for periodontitis. It was possible to observe that age, gender, educational level and smoking were associated with periodontitis in the analysis. Table 5 shows the final results of the multivariate analysis with all the variables included.

A correlation test was also applied between each psychometric instrument (BAI, BDI, STAI and LES) and the clinical variables (PPD, CAL and BOP). The correlation values varied from -0.122 to 0.013 and did not present statistical significance (data not shown).

Discussion

The present study could not show an association between life events, anxiety and depression with periodontitis. The association between psychosocial factors and periodontal diseases is derived mainly from cross-sectional studies (Green et al. 1986, Linden et al. 1996, Monteiro da Silva et al. 1996, Genco et al. 1999, Johannsen et al. 2005, Kiages

Table 3. Mean scores and standard deviation (SD) of anxiety and depression, by different psychometric instruments, in case and control groups

Scale	Case $(N = 96)$	Control $(N = 69)$	p (t-test)
BAI	6.06 ± 4.78	7.34 ± 7.42	0.175
BDI	8.77 ± 6.75	9.33 ± 7.26	0.610
A-trace	37.52 ± 9.28	38.17 ± 9.90	0.665
A-state	35.11 ± 7.32	36.13 ± 9.01	0.426

Table 4. Mean and standard deviation (SD) of life events (total, positive, negative and difference between positive and negative) in case and control groups

Life event scores	Case $(N = 96)$	Control $(N = 69)$	p (t-test)
Number of life event	5.35 ± 2.71	5.28 ± 3.31	0.891
Positive	1.95 ± 1.58	1.73 ± 1.50	0.372
Negative	2.73 ± 2.18	2.68 ± 2.45	0.872
Positive-Negative	-0.76 ± 2.90	-0.97 ± 2.67	0.636

Table 5. Multivariate logistic regression analysis expressing the Odds ratio, 95% confidence intervals (95% CI) and p values

Variables	Odds ratio	95% CI	р
Gender			1
Female	1		
Male	2.716	1.13-6.49	0.025
Age	1.151	1.06-1.24	0.000
Educational level			
College	1	1.14-36.95	0.035
Incomplete elementary school	6.498	0.21-5.48	0.933
Elementary school	1.072	0.16-2.87	0.603
High school	0.683		
Income			
>6 MW	1		
0–2 MW	2.890	0.34-24.99	0.335
2.1–4 MW	4.292	0.55-33.63	0.166
4.1–6 MW	2.273	0.27-18.98	0.449
Smoking status			
Non-smoker	1	1.76-15.50	0.003
Former smoker	5.217	1.67-21.94	0.006
Current smoker	6.058		
BAI	0.946	0.86-1.04	0.257
BDI	0.963	0.88-1.05	0.396
Anxiety trace	1.003	0.95-1.06	0.912
Anxiety state	1.044	0.98-1.11	0.187

MW, minimum wage.

et al. 2005). Moss et al. (1996) observed in a case–control study some association between periodontitis and depression. More recent studies, however, were not able to reproduce these findings (Solis 2002, Vettore et al. 2003).

Differences in results may be explained because of the different approaches used in these studies. Matching is a challenge when dealing with a disease of such a high prevalence as periodontitis. One way of controlling non-paired variables is the use of multivariate analysis. In the present study, it was possible to identify some variables, already pointed out in epidemiological studies as being risk indicators for periodontitis, such as age, tobacco, gender, socioeconomic status (here identified by education and not income) (Bolin et al. 1993, Grossi et al. 1994, Papapanou 1996, Albandar 2002).

There is great difficulty in the literature regarding the establishment of clear criteria to define either health or periodontal disease (Genco 1996, Baelum 1998). Because of this difficulty, this study tried to establish its own criteria for the definition of periodontal disease and health, forming groups with distinct characteristics between them regarding PPD, CAL and BOP.

The periodontal condition of the participants is not usually reported in the studies. Solis (2002) based in the criteria proposed by Machtei et al. (1992) formed groups, specially the controls, with periodontal conditions substantially different from ours. Nevertheless, both studies could not demonstrate associations between psychosocial factors and periodontitis. Different levels of periodontal attachment loss and inflammation are essential in order to guarantee a clear cut difference in exposure among groups. Because of the criteria established, case and control groups presented significant differences in their periodontal status. Mean PPD for cases and controls were 3.44 and 1.96, respectively. Differences were more pronounced when considering attachment level, 4.01 for cases and only 0.95 for controls. Similarly, levels of bleeding on probing were significantly higher in cases (45.09%) than in controls (13.04%).

Discrepancies in the results found in the literature may also be explained by differences in sample sizes of the studies (Linden et al. 1996, Moss et al. 1996, Genco et al. 1999, Solis 2002, Vettore et al. 2003). The present study reported results from a final sample size of 169 individuals, calculated to find a difference in the occurrence of depression between cases and controls of 22%. However, the results presented here revealed an occurrence of depression smaller than the expected. As it is from other studies (Solis 2002, Vettore et al. 2003), the lack of an association between psychosocial factors and periodontitis, in the present study, must be interpreted with caution taking into account the sample size achieve.

Another important aspect of the methodology was the definition of the instruments of psychological analysis (Jorge & Custódio 2000). Up to this moment there are no biological markers available or other measurable ways to define safely most psychiatric disturbances (Menezes & Nascimento 2000). The scales used in this study were chosen because of their validity within Brazilian culture, their wide use in research, their easy and rapid application. They presented high internal consistency confirmed by Cronbach a values. It is therefore possible to confirm the validity of the instruments, their reliability and internal consistency.

The mean LES registered here was higher than the one found by Solis (2002), although neither studies registered differences between case and control groups. In comparison with the results by Monteiro da Silva et al. (1996) and Vettore et al. (2003), the mean score for total, positive and negative events was similar, not showing significant differences between case and control groups. Some other authors who used different scales found significant associations between stress and periodontitis (Marcenes et al. 1993, Moss et al. 1996, Croucher et al. 1997). It is important to point out that individual characteristics, such as social support and ways of coping, may affect the way subjects deal with stressful situations and how they respond to periodontal treatment (Glaser & Kiecolt-Glaser 1994, Rabin 1999, Gamboa et al. 2005).

Anxiety was assessed regarding to both symptoms (BAI) and characteristics of state and trait anxiety (STAI). The BAI scale had never been used before in periodontal analysis. Mean values found in this study are considered minimum anxiety levels for the Brazilian population (Cunha 2001).

Regarding the STAI scale, there were similarities between the findings of this study and those by Monteiro da Silva et al. (1996), Solis (2002) and Vettore et al. (2003). The trait anxiety mean was higher than the state anxiety in all studies, with no significant difference between case and control groups.

Johannsen et al. (2005) found an association of anxiety with increased severity of periodontal disease in smokers, but they use a questionnaire with one single question to evaluate anxiety. Almost all studies and efforts in this field of psychosocial interaction must include one validated instrument to assess these factors.

Regarding to depression examined by BDI, the results are in accordance with those by Solis (2002), as neither studies showed significant differences in depression means between case and control groups. It should be stressed that the indexes found correspond to values considered minimum for Brazilian population (Cunha 2001).

Based on the methodology used and on the results found in the present study, it seems that periodontal disease is more directly associated with demographic and social-cultural characteristics of the population than with psychosocial factors. These results agree with the epidemiological studies that have shown higher prevalence and severity of periodontal disease among older individuals, men, smokers and individuals of a low socioeconomic level (Genco 1996, Papapanou 1996, Gjermo et al. 2002, Albandar 2002). Based on the results obtained here and in other studies carried out in Brazil (Solis 2002, Vettore et al. 2003), it is possible to assume that the association of psychosocial factors with periodontitis may not be as evident as previously supposed, or that Brazilian individuals present coping strategies that ease the effects of these factors on periodontal health. The ability to develop coping skills to buffer the effect of negative life events on health is very important, for example, faith, social interactions and regular exercise can ameliorate the immune function (Rabin 1999). At the moment, there is no validated scale to measure coping in the Brazilian population.

Regarding the evidence that point to an association of psychosocial factors with periodontitis, the results found in this study do not support the hypothesis of experimental models controlled by some observational studies, showing that it is necessary to develop new ways to test the same hypothesis.

References

- Ader, R., Felten, D. L. & Cohen, N. (2001) *Psychoneuroimmunology*, 3rd edition. New York: Academic.
- Albandar, J. (2002) Periodontal diseases in north America. *Periodontology* 2000 29, 31–69.
- Baelum, V. (1998) The epidemiology of destructive periodontal disease. Thesis, Department of Periodontology and Oral Gerontology, Faculty of Health Sciences, University of Aarthus, Aarthus.
- Biaggio, A., Natalíco, L. F. & Speilberger, C. D. (1977) Desenvolvimento da forma experimental em português do inventário de ansiedade Traço-estado (IDATE). Arquivos Brasileiros de Psicologia Aplicada, Rio de Janeiro 29, 31–44.
- Bolin, A., Eklund, G., Frithiof, L. & Lavstedt, S. (1993) The effect of changed smoking habits on marginal alveolar bone loss: a longitudinal study. *Swedish Dental Journal* 17, 211–216.
- Breivik, T. & Thrane, P. S. (2001) Psychoneuroimmune interactions in periodontal disease. In: Ader, R., Felten, D. L. & Cohen, N. (eds). *Psychoneuroimmunology*, Vol. 63, 3rd edition, pp. 627–644. New York: Academic, Cap.
- Croucher, R., Marcenes, W. S., Torres, M. C., Huges, F. & Sheiham, A. (1997) The relation-

ship between life-events and periodontitis. A case–control study. *Journal Clinical Periodontology* **24**, 39–43.

- Cunha, J. A. (2001) Manual da Versão em Português das Escalas Beck. São Paulo: Casa do Psicólogo.
- Gamboa, A. B. O. (2005) The relationship between emotional intelligence and initial response to a standardized periodontal treatment. *Journal of Clinical Periodontology* 32, 702–707.
- Genco, R. J. (1996) Current view of risk factors for periodontal diseases. *Journal of Periodontology* 67, 1041–1049.
- Genco, R. J., Ho, A. W., Kopman, J., Grossi, S. G., Dunford, R. G. & Tedesco, L. A. (1998) Models to evaluate the role of stress in periodontal disease. *Annals of Periodontology* **3**, 288–302.
- Genco, R. J., Ho, A. W., Grossi, S. G., Dunford, R. G. & Tedesco, L. A. (1999) Relationship of stress, distress, and inadequate coping behaviors to periodontal disease. *Journal of Periodontology* **70**, 711–723.
- Gjermo, P., Rosing, C. K., Susin, C. & Oppermann, R. V. (2002) Periodontal disease in central and South America. *Periodontology* 2000 29, 70–78.
- Glaser, R. & Kiecolt-Glaser, J. K. (1994) Handbook of Human Stress and Immunity. San Diego: Academic Press.
- Green, L., Tryon, W. W., Marks, B. & Huryn, J. (1986) Periodontal disease as a function of life events stress. *Journal of Human Stress* 12, 32–36.
- Grossi, S. G., Genco, R. J., Machter, E. E., Ho, A. W., Koch, G., Dunford, R. & Zambon, J. J. (1994) Assessment of risk for periodontal disease.I. Risk indicator for attachment loss. *Journal of Periodontology* **65**, 260–267.
- Johannsen, A., Asberg, M., Söder, P.-O. & Söder, B. (2005) Anxiety, gingival inflammation and periodontal disease in non-smokers and smokers – na epidemiological study. *Journal of Clinical Periodntology* **32**, 488– 491.
- Jorge, M. R. & Custódio, O. (2000) Utilidade das escalas de avaliação para clínicos. In: Gorenstein, C., Andrade, L. H. S. G. & Zuardi, A. W. (eds) Escalas de Avaliação Clínica em Psiquiatria e Psicofarmacologia, Vol. 7, pp. 59–62. São Paulo: Lemos.
- Klages, U., Gordon, A. & Wehrbein, H. Approximal plaque and gingival sulcus bleeding in routine dental care patients relations to life stress, somatization and depression. *Journal of Clinical Periodontology* **32**, 575–582.
- Linden, G. J., Mullally, B. H. & Freeman, R. (1996) Stress and the progression of periodontal disease. *Journal of Clinical Periodontology* 23, 675–680.
- Machtei, E. E., Christersson, L. A., Grossi, S. G., Dunford, R., Lambon, J. J. & Grenco, R. J. (1992) Clinical criteria for the definition for the established periodontitis. *Journal of Periodontology* 63, 207–214.
- Marcenes, W., Croucher, R., Sheiham, A. & Marmot, M. (1993) The relationship between

self-reported oral symptoms and life-events. *Psychology Health* **8**, 123–134.

- Marucha, P. T., Kiecolt-Glaser, J. K. & Farogehi, M. (1998) Mucosal wound healing is impaired by examination stress. *Psychosomatic Medicine* 60, 362–365.
- Menezes, P. R. & Nascimento, A. F. (2000) Validade e confiabilidade das escalas de avaliação em psiquiatria. In: Gorenstein, C., Andrade, L. H. S. G. & Zuardi, A. W. (eds). *Escalas de Avaliação Clínica em Psiquiatria e Psicofarmacologia*, Vol. 2, pp. 23–28. São Paulo: Lemos, Cap.
- Monteiro Da Silva, A. M., Oakley, D. A., Newman, H. H., Nohl, F. S. & Lloyd, H. M. (1996) Psychosocial factors and adult onset rapidly progressive periodontitis. *Jour*nal of Clinical Periodontology 23, 789–794.

Clinical Relevance

Scientific rationale: Psychosocial factors have important influence on the development of infectious disease. It has been proposed that high levels of stress or depression may take part in the onset and progression of periodontal diseases. There is limited evidence that these factors may be risk indicators for periodontitis.

- Moss, M. E., Beck, J. D., Kaplan, B. H., Offenbacher, S., Weintraub, J. A., Koch, G. G., Genco, R. J. & Machtei, E. E. (1996) Exploratory case–control analysis of psychosocial factors and adult periodontitis. *Journal* of Clinical Periodontology 67, 1060–1069.
- Papapanou, P. N. (1996) Periodontal diseases: epidemiology. *Annals of Periodontology* 1, 1–36.
- Rabin, B. S. (1999) Stress, Immune Function, and Health. New York: Wiley-Liss.
- Savoia, M. G. (1995) Relação entre eventos vitais adversos e mecanismos de "coping" no transtorno do pânico. Thesis, Doutorado em Psicologia, Instituto de Psicologia, Universidade de São Paulo, Saõ Paulo.
- Solis, A. C. O. (2002) Associação da Doença Periodontal a Sintomas Ansiosos, Depressivos e Fatores Estressores Psicossociais. The-

Principal findings: Positive associations between periodontal disease and known variables such as age, gender and smoking were observed. However, there were no significant correlations with psychosocial factors such as life events, anxiety and depression.

Practical implications: There are different sources of evidence of a

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Vettore, M. V., Monteiro da Silva, A. M., Quintanilha, R. S. & Lamarca, G. A. (2003) The relationship of stress and anxiety with chronic periodontitis. *Journal of Clinical Periodontology* **30**, 394–402.

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biologic plausibility associating psychosocial factors and inflammation however, a direct correlation between these factors and the periodontal status was not disclosed in the present study. It is conceivable that indirect associations such as coping may be relevant. On the other hand, factors such as age, smoking, gender and educational level were clearly associated. This document is a scanned copy of a printed document. No warranty is given about the accuracy of the copy. Users should refer to the original published version of the material.