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Влияние стресса на клинические исходы безоперационной пародонтальной терапии у пациентов с тяжелым генерализованным пародонтитом

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Резюме

Актуальность. Цель исследования– оценить влияние психоэмоционального стресса на клинические результаты безоперационной пародонтальной терапии у пациентов, страдающих генерализованным пародонтитом тяжелой степени тяжести.

Материалы и методы. Пациенты получили два психологических опросника для оценки уровня стресса, при этом клинические параметры записывались за одну неделю до и через шесть недель после безоперационной пародонтальной терапии.

Результаты. 55 пациентов были последовательно включены в исследование и разделены на две группы в зависимости от уровня стресса (низкий уровень n = 22 и средний / высокий уровень n = 33). Исходно группы были однородными по клиническим параметрам. В то время как снижение показателя кровотечения изо рта было больше в группе с низким уровнем стресса в конце безоперационной пародонтальной терапии, улучшение других клинических параметров было сопоставимым между группами с равным контролем неудовлетворительной индивидуальной гигиены полости рта.

Заключение. Психосоциальный стресс отрицательно влияет на результаты безоперационной пародонтальной терапии, и пациенты с высоким уровнем стресса могут представлять категорию риска для прогрессирования заболевания.

Ключевые слова: воспаление, пародонтит, стресс, безоперационная пародонтальная терапия

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Impact of stress on clinical outcomes of non-surgical periodontal therapy in patients with severe generalized periodontitis

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Abstract

Relevance. Aim – to assess the impact of psychosocial stress on the clinical outcomes in severe periodontitis patients treated with Nonsurgical Periodontal Therapy (NPT).

Materials and methods. Patients received 2 psychological questionnaires to score their stress levels, while clinical data were obtained 1 week before and six weeks after the completion of NPT.

Results. A total of 55 patients were consecutively included in the study and subsequently categorized into different stress levels (low stress level n = 22 and moderate/high stress level n = 33). All clinical parameters were found to be comparable at baseline between groups. While reduction in full-mouth bleeding scores was found to be statistically significantly lower in group with higher stress levels, a similar improvement in the other clinical parameters was observed at the completion of NPT.

Conclusion. Psychosocial stress seems to influence negatively the results of NPT and highly stressed patients may represent a risk category for disease progression.

Key words: infiammation, non-surgical periodontal treatment, periodontitis, stress

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RELEVANCE

Periodontitis is a complex multifactorial pathology of an infectious and inflammatory nature, characterized by progressive destruction of the supporting apparatus of the tooth [1]. The main known risk factors associated with this disease are genetics, smoking and diabetes mellitus with poor metabolic control [2]. In recent years, in connection with the profound transformation of the way of life and living conditions in modern society, the role of new factors related to the psychological sphere of the individual is increasing.

Stress is a person's emotional and physiological response to events that one perceives as a challenge or threat [3]. It can be dealt with strategies that reduce, minimize, cope with the stressful situation, or help cope with it. According to the latest literature, there are two ways to cope with stress: approach (fight) and avoidance (escape) [4]. Based on the quantitative and qualitative assessment of stress elements, neurobiological and neuroendocrine reactions are activated, which, in turn, are reduced to a wide range of adaptive changes in a person of a psychological, behavioral and emotional nature. If the adaptability provided by these systems be-

comes insufficient, the resulting load contributes to a weakening of the immune response and behavior that negatively affects the quality of human life [5-7].

A positive correlation between high levels of stress and the severity of periodontitis has been described in the literature [8-10]. Finally, at the end of non-surgical periodontal therapy, higher levels of inflammatory mediators in the gingival fluid of the gingival sulcus were found in patients with a high level of stress than in patients with a lower level of stress [11]. However, many studies on this issue have not examined the impact of oral hygiene levels. It should be borne in mind that the effects of stress also manifest themselves in behavioral changes in terms of unhealthy diet, smoking and poor oral hygiene, and that bacterial plaque is an etiological factor in periodontal disease.

Thus, the aim of this prospective study was to evaluate the effect of emotional stress on the clinical response to non-surgical periodontal therapy in patients with severe periodontitis.

MATERIALS AND METHODS

A single-center, prospective, triple-blind cohort study was conducted based on the Section of Periodontology C.I.R. School of Dentistry, University of Turin. The study was approved by the Institutional Ethics Committee. *To be included in the study, patients had to meet the following inclusion criteria:*

– Age from 20 to 80 years old;

– Diagnosis: grade III / IV periodontitis, class A / B in accordance with the clinical and radiological criteria of the current classification [12];

– Presence of at least 14 teeth, at least 10 sites with a probing depth (PD) > 5 mm and radiographic loss of alveolar bone;

– Informed consent to participate in the study.

The criteria for excluding indivudals from the research:

– Heavy smokers (> 10 cigarettes / day);

– Patients in the process of orthodontic treatment (with non-removable orthodontic appliances); Pregnant and lactating;

– Patients who have undergone periodontal treatment in the last 6 months; Patients with systemic diseases that affect the clinical response to periodontal treatment (eg diabetes mellitus);

– Patients treated with antibiotics, steroid and / or non-steroidal anti-inflammatory drugs three weeks before the visit, and patients taking drugs that can cause an increase in gum volume (immunosuppressants, estrogen-progestins, calcium channel blockers, anticonvulsants).

Patients were classified by stress level based on the normative values of two psychological tests performed at the first visit to a psychologist: the Perceived Stress Scale (PSS), approved by Cohen in 1983 [13] and the Stress-Related Vulnerability Scale (SVS), approved by Tarsitani in 2010 [14]. The PSS is a ten-question self-report questionnaire that measures how stressful life situations are perceived. It is rated on a 5-point scale (never, almost never, sometimes, quite often and very often). The SVS Self-Reporting Questionnaire consists of nine statements that measure stress-related risk of physical and mental illness. Answers are scored on a 4-point scale (not at all, not enough, enough, many). At the end of the study, the patients were informed about their stress levels.

All patients were interviewed to collect data on demographic characteristics (age, sex), educational level and lifestyle (alcohol consumption, smoking and oral hygiene).

CLINICAL PARAMETERS

1 week before the non-operative periodontal treatment and 6 weeks after the end, the following clinical parameters of the periodontal health of the study participants were measured: using a graduated periodontal probe (PCP 15 / 11.5, Hu-Friedy, Chicago, Illinois, USA) at six points for each tooth With the help of an experienced and calibrated operator, the presence / absence of plaque (PI), the presence / absence of bleeding on probing (BoP), PD, gingival recession (Rec) and the level of clinical attachment (CAL) were assessed. The percentage of sites with PI or BoP was calculated and expressed as a total oral plaque score (FMPS) and an oral bleeding score (FMBS), respectively. Finally, the degree of tooth mobility was recorded [15].

Non-surgical periodontal therapy (NPT)

Quadrant standard debridement (CSD) was performed at 4 follow-up weekly visits using hand-held and ultrasound instruments without additional antimicrobial use. At each session, patients were instructed and motivated to perform correct home hygiene practices using an electric toothbrush and interdental devices that were appropriate for the shape and size of the anatomy of the interdental spaces.

Statistical data analysis: FMBS variation in patients stratified by stress level was considered the main study result. Given the Gaussian distribution of the data, PD and CAL variations were analyzed using a t-test for paired data in each group and a t-test for independent samples between groups. Nonparametric tests were used to analyze temporal changes in FMBS, FMPS, number of teeth, number of sites with PD ≥ 6 mm, number of sites with PD 4-5 mm, and number of sites with PD ≤ 3 mm. The Wilcoxon test was used to calculate intragroup differences, and the Mann-Whitney test was used to compare between groups. The significance level for all analyzes was set at 5%.

RESEARCH RESULTS

The study involved 55 patients, including 35 women (63.6%) and 20 men (36.4%). The moderate and high stress group (group 1) included 33 patients, including 22 women and 11 men, and the low stress group (group 2) included 22 patients, including 13 women and 9 men. Mean age (52.7 years for group 1 and 55.2 years for group 2) and number of smokers (<10 cigarettes per day) were comparable between the two groups (2 smokers in group 1 versus 1 smoker in group 2).

Table 1 shows the data collected at baseline and at follow-up. The two baseline groups were homogeneous in reported clinical parameters. NPT resulted in statistically significant improvement in all clinical parameters studied in both groups ($p < 0.001$). At 6-week follow-up, both groups showed an improvement in the level of their oral hygiene with comparable mean FMPS values (26.8 ± 13.9% in group 1 versus 22.0 + 12.1% in group 2).

The influence of stress on the individual inflammatory response was highlighted. In fact, FMBS underwent a larger contraction in Group 2 compared to Group 1, reaching an average percentage of 20.4 + 14.5%, respectively, versus 33.2 + 12.7%. Regarding the decrease in PD, increase in CAL and change in the number of stratified areas according to PD (≤ 3 mm, 4-5 mm, and ≥ 6 mm), there were no statistically significant differences between the two groups.

FINDINGS

Based on our data, this is one of the few studies in the literature that has analyzed the impact of psychoemotional stress on the clinical outcomes of periodontal treatment. FMBS was chosen as the main outcome for assessing the effect of stress on an individual's inflammatory response. The presence of BOP is associated with the progression of periodontal disease, while the absence of BOP is a predictor of the stability of the periodontal condition over time [16, 17].

In this study, we tried to control factors that may have a decisive influence on BoP or modulate the response to non-surgical periodontal therapy. Therefore, patients with known risk factors such as cigarette smoking and diabetes mellitus were excluded from the study. In addition, taking

Таблица 1. **Сравнение двух групп по уровню стресса (среднее ± стандартное отклонение)**
Table 1. **Comparison between the two groups based on stress level (mean ± standard deviation)**

Параметры Parametri	**За 1 неделю до лечения** / Baseline			**Через 6 недель после лечения** / Follow-up		
	Группа 1 (высокий уровень стресса) Group 1 (high stress)	**Группа 2 (низкий уровень стресса)** Group 2 (low stress)	**p-значение** p-Value	**Группа 1 (высокий уровень стресса)** Group 1 (high stress)	**Группа 2 (низкий уровень стресса)** Group 2 (low stress)	**p-значение** p-Value
Кол-во зубов Number of teeth	25,3 + 2,9	26,6 + 3,4	0,063	25,1 + 2,9	25,9 + 3,7	0,166
FMPS (%)	62,8+ 20,1	68,1 + 20,2	0,839	26,8 + 13,9	22,0 + 12,1	0,306
FMBS (%)	61,1 + 21,5	64,9 + 24,6	0,553	33.2 + 12,7	20,4 + 14,5	0,001
PD (mm)	3,9 + 0,7	4,0 + 0,8	0,515	3.0 + 0,4	3,1 + 0,6	0,759
CAL (mm)	4,7 + 0.9	4,8 + 1,3	0,614	4.1 + 0.7	4,1 + 1,4	0,935
Кол-во участков с PD ≤ 3 mm Number of sites with PD ≤ 3 mm	80,4 + 28,8	81,5 + 30,4	0,904	107,9 + 22,3	112,7 + 35,6	0,192
Кол-во участков с PD 4-5 mm Number of sites with PD 4-5 mm	42,5 + 15,3	45,7 + 17,2	0,395	31,1 + 14,1	30,0 + 18,7	0,565
Кол-во участков с PD ≥ 6 mm Number of sites with PD ≥ 6 mm	28,0 + 26,2	31,2 + 18,1	0,161	12,5 + 13,3	12,6 + 10,7	0,724

into account the new classification of periodontal diseases [12], only patients with generalized periodontitis stage III / IV and grade A / B were included. This was done in order to reduce the influence of the genetic profile on the progression of periodontal diseases by excluding patients with a tendency to rapid progression [2].

As expected, CSD proved to be an effective therapeutic strategy, resulting in statistically significant improvements in clinical parameters. The results are consistent with those of other clinical studies that used the same therapeutic protocol [18-20]. However, it is important to emphasize that the low stress group achieved better control of the inflammation index than the medium / high stress group. At 6-week follow-up, the mean FMBS level was 33% for high stress patients compared to about 20% for low psychological stress patients. Results similar to ours were presented in a study by Bakri et al. (eleven). However, although the present study found no differences in PD, CAL and FMPS between the two compared groups, the latter showed a greater reduction in PD in the low stress group. In addition, it should be noted that Bakri et al. they did not study the amount of bacterial plaque, which, in addition to being an etiological factor in periodontal disease [21], is a confounding variable in the relationship between stress and FMBS [7]. Similarly, other studies reported significant associations between psychological variables and clinical parameters of the periodontium, but did not control these associations for bacterial biofilm accumulation [22-24].

In the present study, FMPS was recorded at baseline and at reassessment, and there was no statistically significant difference in the reduction between the two stress levels. This ruled out the possibility that the different inflammatory response was due to different patient compliance with good oral hygiene at home. In addition, the two groups were initially comparable in severity and degree of periodontal damage. The results of this study are supported by the results of other studies, in which the severity of periodontal disease was associated with the level of stress with the accumulation of the same bacterial plaque [25].

The lower control of inflammation in patients with high stress levels, as evidenced by FMBS values close to or exceeding 30%, demonstrates in this group an increased risk of progression of periodontal disease [17]. At the same time, the FMBS values achieved by patients with a low level of stress, on average about 20%, allow predicting the stability of the periodontal condition over time. These results support observations from other studies suggesting that stress is an independent risk factor for periodontal disease [10, 26, 27].

The mechanism by which stress influences the periodontal response is not fully understood. Psychological stress causes an increase in the level of corticosteroids and catecholamines [6], which cause, respectively, a change in the number and function of polymorphonuclear leukocytes, macrophages and lymphocytes in inflammation foci [28, 29], a decrease in IgA secretion. antibodies and IgG that are active against pathogenic periodontal bacteria [30] and increase the synthesis and activity of prostaglandins and proteolytic enzymes [31].

It has also been shown that stress increases the production of interleukin (IL) -1β, IL-6 and IL-10, while the production of interferon (IFN) -s is decreased [32, 33]. The crevicular fluid in high stress patients contains higher levels of (IL) -1β and elastase [11, 34]. IL-1 controls the vascular response to bacterial attack, regulates the activity of matrix metalloproteinases, which, in turn, modulate the metabolism of matrix components of periodontal connective tissue and stimulate the production of other cytokines, including IL-6 and tumor necrosis factor (TNF). -α [35]. Altered production of these cytokines can affect the healing mechanisms [36].

This study has limitations. The evaluation of the results obtained should take into account the small number of patients and the assessment of stress based solely on psychological tests. Other studies have looked at the concentration of cortisol, a hormone in saliva, as a biological marker of stress or depression [37, 38]. This hormone, which increases blood sugar levels, promotes protein catabolism and modulates anti-inflammatory reactions, is excreted in large quantities with saliva and blood flow in situations perceived by a person as stressful [39].

CONCLUSION

Finding a difference in response to nonsurgical periodontal treatment in patients with low psychological stress than in high-stress patients suggests the importance of including complementary therapies, such as stress management, in the management of the periodontitis patient, highlighting the role of a multidisciplinary approach in diagnostic and clinical stage of management of such patients. In addition, patients with high levels of stress should be given more frequent sessions during active periodontal therapy and then during maintenance periodontal therapy, as they may be at increased risk of disease progression over time.

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