



PERIODONTITIS AS ONE OF SIGNS OF PREMATURE AGING OF PATIENTS UNDER CHRONIC STRESS

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ABSTRACT

Materials and methods: There was conducted a questionnaire on lifestyle and nutrition, the use of the stress tolerance self-assessment test and dental examination of 52 patients with metabolic disorders in the context of military conflict. All patients were in remission of chronic generalized periodontitis. **Results:** Poor and very poor stress tolerance was detected in 38 patients, as a result of which the above patients were assigned to the main group, while the remaining patients formed the comparison group. Clinical picture of periodontal condition of the majority of patients in the main group corresponded to exacerbation of chronic generalized periodontitis; the rate of exacerbation of chronic periodontitis among the patients with high stress-resistance was more than 2 times lower. **Conclusions.** Patients with low stress tolerance are more susceptible to exacerbations of chronic periodontitis, which can be regarded as a risk of premature aging.

KEYWORDS : stress, periodontitis, aging

INTRODUCTION

Aging process is part of the natural course of human life cycle, that is, the chronic, normal loss of regenerative and bioprotective mechanisms occurring in body over time. All body systems are involved in these physiological changes related to aging, as well as organs and tissues of oral cavity undergo physiological aging (1).

However, it is necessary to distinguish normal (physiological) aging processes from those pathological changes occurring against the background of many other factors. Premature aging is much more pronounced and develops much faster than physiological mechanisms due to decrease or complete loss of compensatory mechanisms (2).

Chronic stress is also a proven factor in premature aging. Long-term psychological stress affecting a person, as well as being under the conditions of military activities, disrupts biological rhythms of the body, reduces adaptive mechanisms, slows down cell proliferation process, including oral cavity tissues, in particular periodontium (3).

At the present time it is well known that psychological stress can suppress cell-mediated immune response. Connection between central nervous system and immune system occurs through complex network of bidirectional signals linking the nervous, endocrine, and immune systems. Stress disrupts homeostasis of this network, which in turn alters immune function (4). The routine of life, nutrition, general hygiene and oral hygiene of a person under constant stress changes, which, together with metabolic disorders, results in the appearance of signs of premature aging in the oral cavity (5).

OBJECTIVE:

evaluate the course of chronic periodontitis as aging factor in patients being in the military conflict zone.

MATERIAL AND METHODS

Ethical part

The envisaged measures for safety of patient's health, respect for his/her rights, human dignity and ethical and moral standards comply with principles of the Helsinki Declaration of Human Rights (World Medical Association Declaration of Helsinki, Ethical Principles for Medical Research Involving Human Subjects), the Council of Europe Convention on Human Rights and Biomedicine. All individuals signed an informed consent prior to participation in the study.

Characteristics of patients

There has been carried out dental examination of 52 patients

with metabolic disorders who, before military activities in Ukraine, had chronic generalized periodontitis in remission. The bulk of persons under examination (83.0%) were men, the average age of patients was 42 years (age variability from 23 to 54 years).

Questionnaire

Questionnaire has been developed and used for self-completion by patients. Questionnaire included questions related to nutrition evaluation and consumption of sweets over the past year, frequency of oral hygiene and visits to dentist over the past year. There was also used a self-evaluation test of stress resistance (S. Kouhen and G. Williamson), according to which patients have been stratified into groups (main group and comparison group) (6). Stress resistance has been determined on the basis of total points scored by persons under examination and their age.

Clinical studies:

There was carried out dental examination, index assessment of hygiene level and periodontium state, studied x-ray data and computed tomography data. There was determined clinical attachment loss (CAL), probing depth and bleeding on probing, simplified index of oral hygiene. Measurements have been taken in six tooth areas (mesio-buccal, buccal, distal-buccal, mesio-lingual, lingual, and disto-lingual) using manual periodontal probe. The level of clinical attachment of each area has been recorded by adding probing pocket depth and gingival recession measurements.

Bleeding on probing has been established by observing its occurrence up to 10 seconds after probing depth study. Periodontitis has been diagnosed based on the results of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions (7).

Statistical part

Descriptive statistics have been obtained, average percentage scores and frequency distribution have been calculated. Data have been analyzed using the SPSS software. The *P* value of less than 0.05 has been considered statistically significant.

RESULT

As a result of questioning according to the test of S. Kouhen and G. Williamson for stress resistance evaluation, 38 (73.0%) patients have poor and very poor stress resistance. These patients have been referred to the main group, while the rest 14 (27.0%) had satisfactory and good stress resistance and constituted the comparison group.

According to the questioning, the habitual nutrition nature and individual oral hygiene have been changed in all patients with the outbreak of military activities. This fact was predictable, but it was very interesting whether the normal life routine has been restored. It should be noted once again that all patients have been under the same conditions: the same somatic status, long-term remission of clinical manifestations of periodontitis, the same residence region, the same frequency of dental check-up.

It has been found that only 11 (%) of the main group and 10 (%) of the comparison group returned to the usual oral care regimen present before the outbreak of military activities, while in most patients with low stress resistance, the new nature of nutrition and oral hygiene became habitual (Table 1). It should also be noted that the number of patients who began to smoke has significantly increased.

Table 1 Sample distribution by studied characteristics before and after 12 months from outbreak of military activities

	Main group before, n (%)	Main group in a year, n (%)	Comparis on group before, n (%)	Comparis on group in a year, n (%)
Double tooth brushing	38 (100)	11 (29,0)	14 (100)	10 (71,4)
Smoking	12 (31,5)	20 (52,6)	5 (35,7)	7 (50,0)
Carbohydrate food prevalence	9 (23,7)	29 (76,3)	4 (28,6)	5 (35,7)
Subjectively bad gum health	2 (5,3)	23 (60,5)	1 (7,14)	5 (35,7)

According to changes in oral care, the number and quality of complaints regarding the periodontium state has changed. Thus, if prior to war all patients have been in a state of clinical remission of chronic generalized periodontitis (absence of bleeding and gum pain, absence of exudation from periodontal pockets, teeth mobility), then 12 months after the outbreak of military activities, most patients have noted the deterioration in periodontium state: appearance or increase in bleeding gums, discomfort in gums, large number of dental deposits, teeth mobility, bad breath, difficult food chewing. According to patients, these complaints tended to increase over the past ten months.

Clinical picture of periodontium state in 32 (84.2%) patients of the main group corresponded to an exacerbation of chronic generalized periodontitis: symptomatic gingivitis (hyperemia and edema of gums, papillae and gingival crest), seropurulent exudate on gum palpation, supra and subgingival dental deposits. Periodontal pockets are filled with pathological granulations, teeth mobility (even those fixed during splinting). On orthopantomography and CT – blurred contours of the destroyed bone tissue of interalveolar septa, foci of bone tissue sclerosing. The periodontium of only 6 (15.8%) patients of the main group continued to be in a state of clinical remission. The share of chronic periodontitis exacerbation among patients with high stress resistance was 35.7% of their number, two times less compared to patients with low stress resistance (Table 2).

Table 2 Sample distribution by remission of chronic generalized periodontitis before and after 12 months from outbreak of military activities

	Main group before, n (%)	Main group in a year, n (%)	Compariso n group before, n (%)	Comparis on group in a year, n (%)
Remission of chronic generalized periodontitis	38 (100)	6 (15,8)	14 (100)	9 (64,3)

Exacerbation of chronic generalized periodontitis	0	32 (84,2)	0	5 (35,7)
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Clinical event

A three-year clinical supervision of the patient P, 47 years old, with an initial diagnosis of chronic generalized periodontitis degree II type B has been presented. At the first visit (September 2021), complaints of discomfort and bleeding of gums, teeth mobility and inability to bite off solid food, bad breath have been noted. Psycho-emotional status of the patient has not been burdened, the patient did not smoke. Edema, alveolar hyperemia, alveolar gingiva on palpation – seropurulent exudate from periodontal pockets, and I-III severity teeth mobility have been observed. When teeth joining, traumatic occlusion has been observed. Orthopantomographic examination of the upper and lower jaws revealed the generalized uneven destruction of alveolar processes (Fig. 1).



Fig 1. Patient P, 47 years old, orthopantomography, diagnosis – chronic generalized periodontitis degree II (September 2021). Generalized uneven bone destruction is observed.

Baseline index of dental plaque, bleeding, depth of periodontal pockets, recession level, teeth mobility degree, and lesions of furcation zones have been consistent with the diagnosis.

The examination revealed an unfavorable prognosis for teeth 18, 28, 38, 37, 36, 46, intermediate prognosis for teeth 17-15, 26-27, 35, 45, 47-48. For the remaining teeth, the preliminary prognosis is favorable.

In the course of treatment, the elimination of local unfavorable factors affecting the development of dystrophic-inflammatory processes in periodontal tissues and teeth preservation has been carried out.

Remedial measures provided for phased combined periodontal treatment, comprehensive rehabilitation, achievement of clinical well-being and stabilization.

Preventive measures included training in individual oral hygiene and monitoring of its implementation. Semi-permanent fixed splinting has been used to eliminate the mobility of teeth 36-37 and 44-45.

Treatment outcomes in a year (February 2022) are presented on parodontogram clearly showing the bone tissue state remaining at the last visit level (Fig. 2). Visually, there have been observed multiple recessions, absence of signs of mucosal inflammation, the gum tightly covered the teeth necks, oral hygiene is satisfactory.

However, even persistent clinical well-being achieved 5 months after treatment initiation does not suggest the sustained remission, since there is a focus of destruction of periapical and periodontal tissues in the area of tooth 16, 27, 36-37, 46.



Fig. 2. Patient P, orthopantomography, diagnosis – chronic generalized periodontitis degree II type B, in remission (February 2022)

Examination in 12 months (February 2023), during which the patient has been exposed to chronic stress due to being in an armed conflict zone, revealed complaints of deterioration in gingival state, excessive bleeding, suppuration, inability to bite off and chew food, strong mobility not only of the lateral, but also of the frontal teeth group on the lower jaw. After testing for stress resistance, he has been referred to the main group (low stress resistance). According to the patient, he is constantly in a state of chronic stress and depression. Notes a change in the frequency of individual oral hygiene (one-time and non-regular tooth brushing), smoking. Notes complaints of pain and bleeding gums, teeth mobility and bad breath. Edema, alveolar hyperemia are clinically determined, alveolar gingiva on palpation – seropurulent exudate from periodontal pockets, I-III severity teeth mobility, traumatic occlusion.



Fig. 3. Patient P, clinical diagnosis – chronic generalized periodontitis degree II type B, exacerbation. Pronounced visual signs of gingival inflammation (February 2023).

However, the studies revealed a discrepancy between clinical and radiological diagnosis, in view of increase in foci of destruction of periapical and periodontal tissues in the area of teeth 17-16, 27, 36-37, 46-47 and unevenly increasing resorption of cortical plate in the area of 34-44 teeth (Fig. 4).

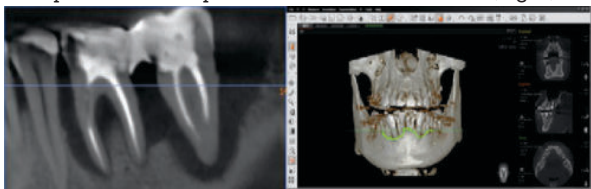


Fig. 4. Patient P, intraoral X-ray of tooth 36-37. Diagnosis – aggressive generalized severe periodontitis (February 2023). Unfavorable state of bone tissue 12 months after periodontal and endodontic treatment. Computed tomography data. Diagnosis – aggressive generalized severe periodontitis (February 2023). Unfavorable state of the bone tissue of frontal teeth 12 months after periodontal treatment.

Presented clinical supervision of the patient being close to the zone of military activities and transformation of periodontal

tissue changes from chronic generalized periodontitis degree II type B in remission to aggressive generalized severe periodontitis during 12 months confirms the direct impact of chronic stress and changes in oral hygiene nature on dental health.

DISCUSSION

The outcomes of this study in representative population sample indicate an increased prevalence of exacerbation of chronic generalized periodontitis among participants of the main group exposed to chronic stress (84.2%), 2 times higher than in individuals with high stress resistance being in the same basic conditions. This is consistent with previous reports (8).

Oral cavity is a separate anatomical zone located in immediate proximity to the central organ of nervous system – the brain, also being under the influence of chronic stress and responding to its action with characteristic changes. It has been proven that under the influence of chronic stress there are always changes in human lifestyle and habits. On the one hand, stress encourages a person to cope with existing problems through psychoactive substances, alcohol, tobacco, unhealthy nutrition. Circulating nicotine leads to vasoconstriction caused by adrenaline and noradrenaline rush, which can lead to lack of nutrients for periodontal tissues (9). On the other hand, stress contributes to excessive allostatic load, which leads to dysfunction of physiological mechanisms. The tone of smooth muscles of blood vessels may also transform as a result of changes in emotional background through autonomic nervous system (10).

It is important to note that under the influence of stress, habitual oral care almost always changes, the priority vector shifts, and a person, on the subconscious level, ignores the consistency in teeth and tongue brushing, which has been demonstrated in our study. The termination of chronic stress influence does not always lead to hygiene normalization, and the patient gets used to new conditions with insufficient hygienic care.

It has been stated that chronic stress is a risk factor for gingival inflammation with increased level of space interleukin-b and reduced quality of oral hygiene (11).

It is acknowledged that emotional states change the diet, thereby indirectly affecting the periodontium state. This may include, for example, consumption of excess amount of refined carbohydrates and softer diet requiring less vigorous chewing and, therefore, predisposing dental plaque accumulation at the approximate risk place.

Stress potentiates pituitary-adrenal axis leading to increase in blood serum corticosteroid level, which is thought to have an anti-stress effect. Increase in cortisol, adrenaline, and noradrenaline level contributes to suppression of immune responses, especially in keeping the physiological balance between oral resident microflora and local immune system, and changes in perception of irritants from various mucosal receptors. Recent studies have confirmed the fact that the concentration of cytokines (IL-6, IL-1 β , and others) of cortisol in CSF is higher in individuals with signs of depression (12).

Since chronic stress and factors, listed and associated with it, are a significant common risk factor for premature aging development, therefore, rapidly progressive chronic periodontitis can be considered in this context.

CONCLUSIONS

In accordance with the obtained results, it has been demonstrated that persons with low stress resistance are more susceptible to exacerbations of periodontal diseases, being in remission for a long time, which can be considered as a risk of

body premature aging development.

Strategies for coping and managing stress, along with improving both general and dental health, can prevent the risk of premature aging development.

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