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## ASSESSMENT OF PERCEIVED STRESS LEVEL AND PERIODONTAL TISSUE STATUS IN SERVICEMEN OF THE ARMED FORCES OF UKRAINE

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## ОЦІНКА РІВНЯ СПРИЙНЯТТЯ СТРЕСУ ТА СТАНУ ТКАНИН ПАРОДОНТА У ВІЙСЬКОВОСЛУЖБОВЦІВ ЗБРОЙНИХ СИЛ УКРАЇНИ

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### ABSTRACT

Scientific studies clearly indicate a two-way link between psycho-emotional state and somatic health. The condition of the oral cavity is considered a sensitive indicator of general health and psychological load. A leading factor influencing the high prevalence of periodontal tissue disease among Ukrainian servicemen is its significant share in overall dental morbidity during partial mobilization. During military service, the number of people requiring dental care increases significantly.

**The aim of the study** is to conduct a comprehensive analysis and establish the relationship between the level of perceived stress and the condition of periodontal tissues in servicemen of the Armed Forces of Ukraine.

**Materials and Methods of the Study.** A number of psychological questionnaires were used to determine the negative mental states of servicemen participating in combat operations. Specifically, the Spielberger-Khanin State-Trait Anxiety Inventory (STAI), the Brief Anxiety, Depression, and PTSD Scale, and the Primary Screening of Post-Traumatic Stress Disorder (PTSD) were used. Oral hygiene status was assessed using the hygiene indices of J. C. Green, J. R. Vermillion (OHI-S, 1964) and Fedorov-Volodkina. The condition of the periodontal tissues was assessed using the PMA index modified by C. Parma.

**Results.** The majority of military personnel interviewed reported moderate levels of situational anxiety (43,40% of respondents). It should also be noted that a significant number of respondents reported high levels of situational anxiety (33,62%). This indicates that these individuals experience intense emotional distress in stressful situations. A high level of personal anxiety was found in 21,70% of military personnel. In such individuals, anxiety

can manifest itself in any situation, even when there is no real danger. In 122 individuals, mental manifestations of anxiety and depression were expressed according to the analysis of the short scale for anxiety, depression, and PTSD. The results of the Primary Screening Test for Post-Traumatic Stress Disorder (PTSD) indicated that 124 individuals (52,76%) have problems associated with psychological trauma. In 41 patients (33% of those examined), the mean PMA index value was  $(19,61 \pm 2,85)\%$ , which corresponded to a mild degree of gingivitis. In 52 patients (43% of those examined), the PMA index values corresponded to a moderate degree of gingivitis ( $(37,08 \pm 6,20)\%$ ). A severe degree of gingivitis was visualized in 29 patients (24% of those examined). The mean PMA index value was  $(58,86 \pm 5,69)\%$ .

**Conclusions.** As a result of the study, it can be stated that with increased indicators of anxiety and depression levels, a significant increase in indicators of inflammatory processes in periodontal tissues is observed. This tendency contributes to the development of inflammatory periodontal diseases or the exacerbation of their chronic forms.

## ІНФОРМАЦІЯ

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**Ключові слова:** сприйняття стресу, тривожність, ПТСР, пародонтальні індекси, пародонт, військовослужбовці.

## АНОТАЦІЯ

Наукові дослідження чітко вказують на двосторонній зв'язок між психоемоційним станом і соматичним здоров'ям. Стан ротової порожнини розглядається як чутливий індикатор загального здоров'я та психологічного навантаження. Провідним фактором, який впливає на великий ступінь захворюваності тканин пародонта серед військовослужбовців України, є її значна питома вага в загальній стоматологічній захворюваності під час часткової мобілізації. Під час проходження служби кількість людей, які потребують стоматологічної допомоги, значно збільшується.

**Мета дослідження** – проведення комплексного аналізу та встановлення взаємозв'язку між рівнем сприйняття стресу та станом тканин пародонта у військовослужбовців Збройних Сил України.

**Матеріали та методи дослідження.** Для визначення негативних психічних станів військовослужбовців учасників бойових дій використано ряд психологічних опитувальників. Зокрема, застосовано шкалу оцінки рівня реактивної (ситуативної) та особистісної тривожності Ч. Д. Спілбергера – Ю. Л. Ханіна, коротку шкалу тривоги, депресії та ПТСР, а також первинний скринінг посттравматичного стресового розладу (ПТСР). Гігієнічний стан порожнини рота оцінювали за допомогою гігієнічних індексів J. C. Green, J. R. Vermillion (ОHI-S, 1964) та Федорова – Володкіної. Оцінку стану тканин пародонта проводили за допомогою індексу РМА в модифікації С. Парма.

**Результати.** В опитаних військовослужбовців переважає середній рівень ситуативної тривожності (43,40% опитаних). Варто відмітити також значний показник високого рівня ситуативної тривожності (33,62% опитаних). Це вказує на те, що для зазначених осіб характерна висока інтенсивність емоційних переживань стосовно стресових ситуацій. Високий рівень особистісної тривожності виявлено у 21,70% військовослужбовців. У таких осіб тривога може проявлятися в будь-яких ситуаціях, навіть коли реальної небезпеки не існує. У 122 осіб виражені психічні прояви тривожності та депресії згідно з аналізом короткої шкали тривоги, депресії та ПТСР. За результатами первинного скринінг-тесту посттравматичного стресового розладу (ПТСР) відмічено, що у 124 осіб (52,76%) присутні проблеми, пов'язані з психологічною травмою. У 41 пацієнта (33% обстежених) середнє значення індексу РМА становило  $(19,61 \pm 2,85)\%$ , що відповідало легкому ступеню гінгівіту. У 52 пацієнтів (43 % обстежених) показники індексу РМА відповідали середньому ступеню гінгівіту ( $(37,08 \pm 6,20)\%$ ). У 29 пацієнтів (24% обстежених) візуалізовано важкий ступінь гінгівіту. Середнє значення індексу РМА становило  $(58,86 \pm 5,69)\%$ .

**Висновки.** За результатами проведеного дослідження можна констатувати, що за підвищених показників рівнів тривожності та депресії спостерігається значне підвищення показників наявності запальних процесів у тканинах пародонта. Така тенденція сприяє розвитку запальних захворювань тканин пародонта або загострень їх хронічних форм.

**Introduction.** Modern military service, especially in the context of large-scale aggression and combat operations, is an extreme stressor that requires constant mobilization of the body's adaptive resources [1, 2]. The intensity of servicemen's stress perception largely depends on the duration of exposure to combat factors on the soldier's psyche, as well as on individual characteristics of reaction to the action of these factors [3].

The main reactions that can develop as the body's response to combat events are combat stress, combat psychological trauma, and post-traumatic stress disorder [3]. Anxiety is a natural reaction of the human body to stress. Anxiety is a psychological term that describes feelings of tension, nervousness, and fear that arise in various situations. It can be short-term or prolonged. However, if anxiety becomes constant and excessive, it can be the cause of a psychological disorder. Individuals with an anxiety disorder constantly feel anxious, regardless of the situation, which significantly affects their daily life and quality of life [3].

Stress can be defined as a threat to a person's physiological or psychological integrity, leading to the development of a general adaptation syndrome and accompanied by a number of reactions (autonomic and behavioral) aimed at maintaining homeostasis [4]. One of the leading factors in the combat effectiveness of the army is the state of health of the personnel, including the dental component [4].

Scientific studies clearly indicate a two-way link between psycho-emotional state and somatic health [5]. The condition of the oral cavity is considered a sensitive indicator of general health and psychological load. Immune system dysfunction and endocrine changes caused by stress can directly affect: the oral microbiome (enhanced growth of periodontopathogenic bacteria), salivation (change in pH and reduction of protective properties of saliva), behavioral factors (reduced motivation for quality hygiene, bruxism, unbalanced diet), which are leading factors in the development of caries, gingivitis, and generalized periodontitis [5, 6].

The relevance of the problem of preserving the dental health of servicemen is due to the fact that their prolonged stay in conditions of combat operations, chronic stress, the presence of various injuries and contusions of varying severity

negatively affect their health and lead to a violation of the body's adaptive mechanisms [6].

The peculiarities of military service reduce the level of personal hygiene and dental health. Constant combat stress, psychological and physical loads negatively affect the immune system of servicemen, causing both general and local immunodepression [7]. Often after combat missions, servicemen report an increase in complaints of pain in the maxillofacial area, which is associated with the exacerbation of chronic processes [7].

A leading factor influencing the high prevalence of periodontal tissue disease among Ukrainian servicemen is its significant share in overall dental morbidity during partial mobilization. During service, the number of people requiring dental care increases significantly [6].

Chronic stress can cause a number of disturbances in the bio-balance of the oral cavity, in particular, salivary gland dysfunction, decreased buffer capacity of saliva, disruption of the microbiocenosis, and the development of oxidative stress, which create conditions for the development of enamel demineralization, inflammatory periodontal diseases, and changes in the oral mucosa. Psycho-emotional disorders lead to changes in patient behavior, including non-compliance with oral hygiene, harmful habits, and changes in diet. The combination of these factors necessitates the implementation of a multidisciplinary approach to the study of generalized periodontitis in patients with signs of PTSD [8].

Despite a significant number of works dedicated to combat stress, a comprehensive analysis of the relationship between the subjective level of stress perception and the objective state of periodontal tissues among Ukrainian servicemen is still insufficient.

**The aim of the study** is to conduct a comprehensive analysis and establish the relationship between the level of perceived stress and the condition of periodontal tissues in servicemen of the Armed Forces of Ukraine.

**Materials and Methods of the Study.** The study was conducted at the Dental Department of the University Clinic of I. Horbachevsky Ternopil National Medical University of the Ministry of Health of Ukraine.

**The study was voluntary.** All procedures were carried out after the servicemen reviewed and

signed the informed consent for dental procedures. The procedures were approved by the Bioethics Commission of I. Horbachevsky Ternopil National Medical University of the Ministry of Health of Ukraine.

235 servicemen who are combat veterans were involved in this stage of the study. An analysis of 235 questionnaires for each of the psychological instruments was performed. Based on the results of the psycho-emotional state assessment, 122 individuals were selected for the subsequent stages of the study.

A number of psychological questionnaires were used to determine the negative mental states of servicemen participating in combat operations. Specifically, the Spielberger–Khanin State-Trait Anxiety Inventory (STAI), the Brief Anxiety, Depression, and PTSD Scale, and the Primary Screening of Post-Traumatic Stress Disorder (PTSD) [3] were used. The condition of the periodontal tissues was assessed using the PMA index modified by C. Parma. Statistical processing of the obtained research results was carried out using the Excel program.

Results of the Research and Discussion. The situational anxiety scale assesses the current state of anxiety, indicating how the respondent feels at the moment, analyzing subjective feelings of fear, nervousness, tension, autonomic nervous system excitement, and restlessness in general. The results of processing the respondents' answers are presented in Figure 1.

In 54 individuals, the scores were within 28–30 points, which indicated a low level of situational anxiety. In 102 individuals, the results

ranged from 41–45 points, indicating an average level of situational anxiety. In 79 respondents, the results were 50–65 points, which is an indicator of a high level of situational anxiety.

It can be concluded that the surveyed servicemen showed a predominance of the average level of situational anxiety (43,40% of respondents). A significant indicator of a high level of situational anxiety (33,62% of respondents) should also be noted. This indicates that these individuals are characterized by a high intensity of emotional experiences regarding stressful situations. A low level was noted in only 22,98% of the surveyed individuals.

The Personality Anxiety Scale assesses stable aspects of personality, namely the feeling of calm and security, indicating a tendency to worry. Personal anxiety reflects an individual's predisposition to anxiety and reveals their tendency to perceive situations as threatening.

In 98 people, the scores were between 23 and 30 points, indicating a low level of personal anxiety. In 86 people, the results varied between 38 and 45 points, indicating an average level of personal anxiety. In 51 respondents, the results were above 45 points, which is an indicator of a high level of situational anxiety.

During the analysis of the obtained results, it should be noted that there is a relatively even ratio of respondents with low and average levels of personal anxiety (41,70% and 36,60%, respectively). This indicates that individuals feel self-confident and are not particularly prone to anxiety. Only certain threatening situations can throw them off their emotional balance.

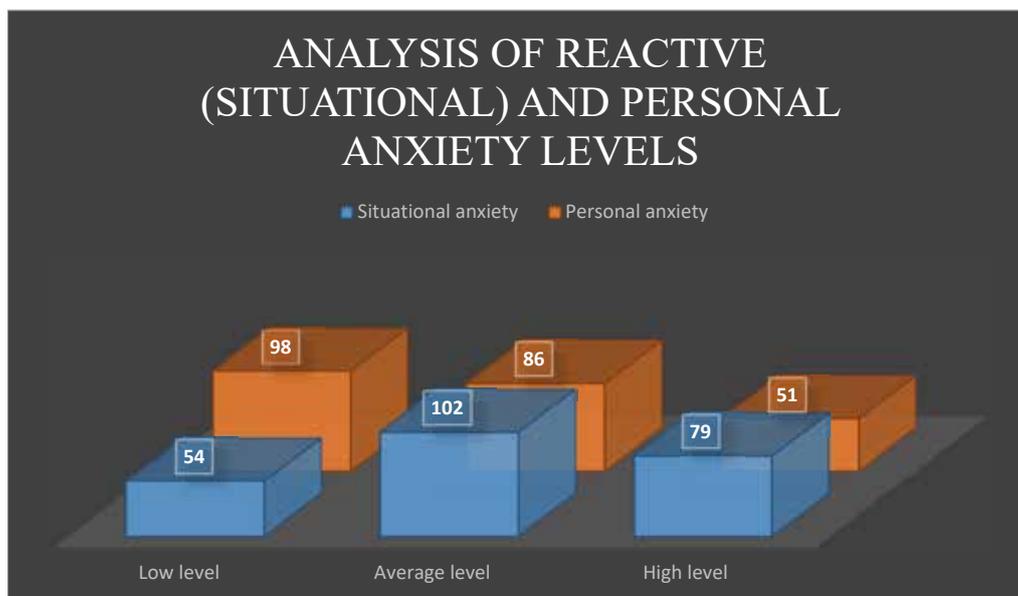


Fig. 1. Analysis of reactive (situational) and personal anxiety levels in servicemen

A high level of personal anxiety was found in only 21,70% of military personnel. In such individuals, anxiety can manifest itself in any situation, even when there is no real danger. Individuals with high levels of personal anxiety express their feelings emotionally and become nervous. This can have a negative impact on military activities during the performance of professional tasks.

The next stage of this research was to conduct a primary screening of the main symptoms of depression in military personnel who had experienced various types of psychological trauma using the Brief Anxiety, Depression, and PTSD Scale (Table 1). During the evaluation of the questionnaire results, more than four “yes” answers to the listed questions served as a “critical” value for determining the presence of mental health disorders.

When analyzing the Brief Anxiety, Depression, and PTSD Scale, 122 individuals (51,91% of respondents) scored 4 or more points. This indicated that the surveyed individuals had pronounced mental manifestations of anxiety and depression.

**Table 1**

Results of the Brief Anxiety, Depression, and PTSD Scale

Points	Number of individuals	%
1	31	13,19
2	29	12,34
3	53	22,56
4 or more	122	51,91

The results of the Primary Screening Test for Post-Traumatic Stress Disorder (PTSD) are presented in Table 2.

**Table 2**

Results of the Primary Screening Test for Post-Traumatic Stress Disorder (PTSD)

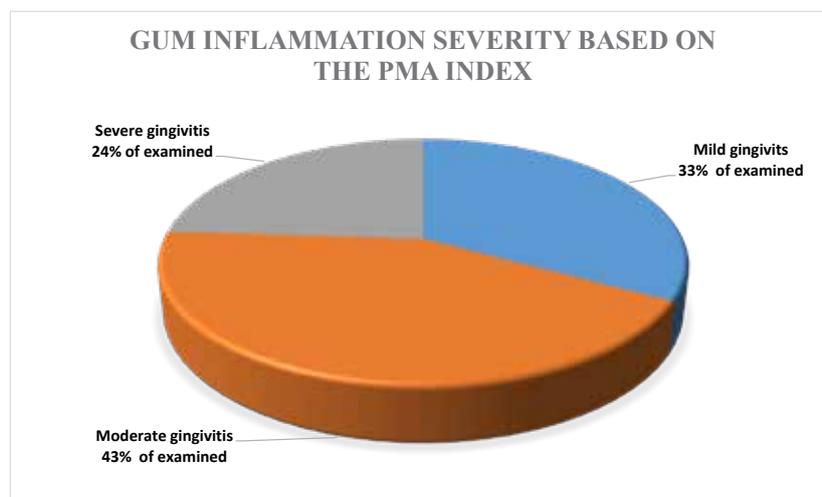
Points	Number of individuals	%
1	48	20,43
2	63	26,81
3 or more	124	52,76

When analyzing the questionnaire for screening post-traumatic stress disorder, the results were considered “positive” if the respondent answered “yes” to three or more questions. The analysis of the questionnaires showed that 124 individuals (52,76%) have problems associated with psychological trauma.

It should be noted that the presence of three positive answers indicated that the person has certain signs or problems associated with psychological trauma. Such individuals are recommended to consult with specialists in the field of psychology and conduct a more in-depth psychodiagnosis. Thus, for the subsequent stages of the study, 122 individuals who previously showed signs of psychological trauma were selected from the general sample of patients, which consisted of 235 servicemen who were combat veterans.

The PMA index modified by C. Parma (1960) was used to determine the intensity of gingival inflammation in the papillary, marginal, and alveolar parts. The distribution of patients according to the PMA index is illustrated in Figure 2.

In 41 patients (33% of those examined), inflammation of the gingival papillae was only observed. The mean PMA index value was  $(19,61 \pm 2,85)\%$ , which corresponded to a mild degree of gingivitis.



**Fig. 2.** Gum inflammation severity based on the PMA index

In 52 patients (43% of those examined), combined staining of glycogen in the areas of the gingival papillae and the marginal part of the gums was noted. The mean PMA index value was  $(37,08 \pm 6,20)\%$ , which corresponded to a moderate degree of gingivitis.

A severe degree of gingivitis was visualized in 29 patients (24% of those examined), including inflammation of the gingival papillae, marginal, and alveolar parts of the gums. The mean PMA index value was  $(58,86 \pm 5,69)\%$ , which corresponded to a severe degree of gingivitis.

The obtained data, demonstrating the predominance of average and high levels of situational anxiety and a high percentage of servicemen with a positive screening for signs of PTSD (52,76%), confirm that military activity in combat conditions is a powerful traumatic factor. High situational anxiety is a direct acute reaction to threat and danger, while signs of PTSD indicate a chronic inability of the psyche to integrate traumatic experience. Importantly, a high level of perceived stress [9], which was indirectly assessed through anxiety, is a key mechanism that depletes adaptive resources [9, 10]. It is the subjective perception of events as threatening and uncontrollable that initiates a cascade of physiological reactions that affect somatic systems. As a result, changes occur in periodontal tissues, which are realized through disturbances

in hormonal, immune balance, and changes in patient behavior.

It is scientifically proven that with high indicators of anxiety, the levels of cortisol and adrenaline increase, which causes vasospasm, deterioration of blood supply and nutrition to the gums. Cortisol contributes to the reduction of collagen synthesis and suppresses immune defense. This, in turn, leads to an increase in the level of inflammatory cytokines and the destruction of connective and bone tissue [11, 12]. It should be noted that such patients often exhibit non-compliance with hygiene, smoking, bruxism, and pathological tooth wear, which exacerbate the damage to periodontal tissues.

**Conclusions.** The systemic influence of chronic stress and the peculiarities of military service lead to changes in oral care among servicemen. As a result of the study, it can be stated that with increased indicators of anxiety and depression levels, a significant increase in indicators of inflammatory processes in periodontal tissues is observed. This tendency contributes to the development of inflammatory periodontal diseases or the exacerbation of their chronic forms.

**Perspectives for Further Research.** It is planned to investigate saliva indicators, particularly the cortisol level, in servicemen who are prone to the development of PTSD.

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