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# Study of vegetative parameters in neurotic disorders in participants of the Second Karabakh War under the influence of various emotiogenic factors

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**In this work, we investigated the parameters of vegetative support in participants of the Second Karabakh War aged 20-40 years in a calm state and under various emotiogenic influences. It was revealed that age characteristics of the dynamics of vegetative functions are objective, individual-typological indicators and differ in cardio-respiratory parameters of functions and changes in emotional-vegetative reactivity. Under conditions of physiologic congestion, heart rate, respiratory rate and emotional-vegetative indicators in practically healthy men show high variability of absolute values. In middle-aged neurotic disorders, disorders in the regulation of suprasegmental apparatuses of the autonomic nervous system were revealed.**

***Keywords****: Participants in the Second Karabakh War, vegetative status, emotiogenic factors, neurotic disorders*

## INTRODUCTION

At present, a sufficient amount of factual material has been accumulated, allowing us to speak about the presence of vegetative disorders, which occupy a significant place in the clinical picture of neuroses (Gefele, 2016; Vein, 2000; Vorobyova et al., 2000).

The conditions of modern life are characterized by a variety of negative impacts: war, earthquakes, which lead to the development of neurogenic depressions (Bodrov et al., 2016; Vorobyova et al., 2000). Neurotic disorders are one of the most pressing problems of the middle-aged population of Azerbaijan, which was exposed to psychogenic factors of the Second Karabakh War (Bashkireva et al., 2016; Bundalo, 2009; Dyukova, 1977; Kolosova, 2000).

The clinical expression of human emotional and behavioral reactions are vegetative manifestations: changes in complexion, heart rate, breathing, chills, fluctuations in blood pressure (BP), etc. This indicates the existence of psychovegetative unity, determined by both anatomical and physiological and functional and biological data, inherent in both a healthy person and a sick person (psychovegetative syndrome) (Kadyrov, 2012; Kekelidze, 2009; Sartaev, 2010).

When studying patients with neuroses, strong interhemispheric and interzonal correlation connections were found in the frontal regions of the brain. In patients with motor disturbance, weaker connections were noted in these areas and between the occipital regions of the brain. A healthy person reacts selectively and has a so-called psychophysiological pattern underlying his behavior. A sick person mobilizes all vegetative systems diffusely.

This is based on a special state of brain homeostasis: the presence of diffuse generalized activation of non-specific brain systems, both in the ascending (biorhythms of the brain) and descending directions, as well as vegetative indicators: heart rate (HR), respiratory rate (RR),

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galvanic skin response (GSR), arterial pressure (AP), the amplitude of the plethysmogram (APG), etc. (Kolosova, 2000; Solovieva et al., 2000; Voloshin, 2005; Zuikova, 2013).

A number of authors studied vegetative indicators in patients with panic disorders (Evdokimov et al., 2008, Gefele, 2016; Vorobyova et al., 2000) and found that panic attacks in 1/3 of cases are accompanied by an increase in both BP and HR, and in 60% of patients only an increase in HR. Although, in general, patients with panic disorders are normotonic, according to the authors, they may experience hypertensive reactions (Solovieva et al., 2000; Vorobyova et al., 2000; Yumatov, 2001). The problem of studying vegetative indices in war participants of different ages with neurotic disorders under various functional conditions has not been given due attention.

The main objective of this work is to study the vegetative sphere in participants of the II Karabakh War with neurotic disorders (20-40 years) under various functional conditions of the brain caused by emotiogenic effects.

## MATERIALS AND METHODS

We conducted studies on 40 men (aged 20-40 years) who participated in the war and received various injuries. Patients with neurotic disorders were divided into two age groups 20-30 (first group) and 30-40 years (second group), each age group of 20 people. Polygraphic studies included simultaneous recording on a 16-channel electroencephalograph from the Neurosoft company, vegetative indicators - ECG, PNG, APG and KSR were studied in various functional states (FS): calm, tense, negative and positive - emotional.

The calm state of the subjects was recorded after a preliminary 15-20-minute adaptation in a darkened room, in relaxed wakefulness, half-lying with eyes closed. The stressful state was created by modeling mental load - mental arithmetic (solving arithmetic problems of varying complexity). Modeling of the negative emotional state was carried out by verbal censure. Positive emotional state was modeled by verbal approval. According to the clinical syndrome, psychoneurological disorders were characterized by pronounced anxiety, an emphasis on somatic complaints, emotional-affective disorders in the form of a constant state of anxiety. Verification of existing psychoneurological disorders was carried out by employees of the Republican Psychiatric Hospital No. 1 of the Ministry of Health of the Republic of Azerbaijan. Electrocardiogram (ECG) was recorded in the II standard lead, pneumogram (PNG) was carried out using a sensor of the company "Nihon Koden", which was fixed on the skin of the subjects near the nasal passage. Plethysmogram (PG) was recorded using a sensor of the company "Nihon Koden" from the index finger of the left hand. The galvanic skin response (GSR) was recorded using the Tarkhanov method (Shoifet, 2008) from the dorsal palmar surface of the hand using flat lead plates with an area of 3-4 $cm^2$.

The study of the autonomic nervous system consisted of studying the autonomic reactivity (according to the oculocardial, sinus-carotid and solar tests). The autonomic support of mental activity was determined in tense, negative and positive emotional states, and the autonomic support of physical activity according to ortho- and clinostatic tests. Systolic and diastolic blood pressure were also measured in all tests.

All indicators obtained as a result of the studies were processed in accordance with the Student-Fisher criteria (Korolyuk et al., 1985).

## RESULTS AND DISCUSSION

In men with neurotic disorders aged 20-30 years, compared to healthy people, the heart rate at rest increases sharply from 72.1±2.1 to 92.0±4.4 ($p<0.01$). In a stressed state, an increase in HR was observed from 84.0±2.7 to 98.0±3.2 ($p< 0.01$), in RR a decrease was noted from 21.0±4.0 to 18.0±0.9. In negative emotional states, an increase in HR dynamics was observed from 78.0±3.4 to 84.0±2.8 hr/min, RR increased from 18.7±2.1 to 20.0±2.1 hr/min, APG changed from 1.7±0.1 to 2.1±0.1 ($p<0.01$), GSR from 1.3±0.1 to 1.8±0.2 ($p<0.05$). In positive emotional states, HR increased from 82.1±4.5 to 97.6±2.4 hr/min. ($p<0.05$), RR from 20.0±0.5 to 24.0±0.7

($p<0.001$), APG from 1.2±0.1 to 1.6±0.1 ($p<0.01$), and galvanic skin response from 1.2±0.2 to 2.1±0.3 ($p<0.05$). In practically healthy people of this age, no significant changes were observed in the functional state of HR, RR, APG, and GSR severity.

In men with neurotic disorders aged 30-40 years, in comparison with healthy individuals, changes in HR dynamics were observed in a calm state; when simulating a state of tension in the same group, HR increased from 82.0±2.1 hr/min to 90.0±2.3 hr/min ($p<0.05$), RR from 20.0±1.0 to 22.0±1.0, and GSR decreased from 1.7 ±0.2 to 1.2± 0.13 ($p<0.05$) (Table 1). With a negative emotional state, an increase in HR was noted, respectively, from 76.0±0.4 to 81.0±0.3 hr/min ($p<0.001$). With a positive emotional state, HR increased from 80.1± 2.3 to 88.0±2.3 hr/min. ($p<0.05$), APG- from 1.2 0.1 to 1.6±0.15 ($p<0.05$), the severity of the GSR from 1.1± 0.1 to 1.8± 0.3, ($p<0.05$). The APG of healthy individuals aged 30-40 years does not change under functional loads, however, in men with neurotic disorders in a tense state, there is a decrease in this indicator from 1.0 ± 0.4 to 0.5 ± 0.3, and in a positive emotional state, an increase from 1.0 ± 0.4 to 1.6 ± 0.15. Reliable changes in the GSR in healthy individuals are observed only when simulating a stressful state. In this case, the GSR indicator increases from 1.0 ±0.2 to 1.7 ± 0.2 ($p<0.05$). In practically healthy people of this age, the heart rate increases in all functional states and the respiratory rate in a positive emotional state. When pressure is applied to reflexogenic zones in people aged 20-30, the pulse rate has minor deviations from background values, from 73.4 ±2.9 to 62.3± 3.1; in practically healthy people at this age, when compared with the background state, a reliable decrease in heart rate was observed in oculo-cardiac and solar tests (Table 2).

In people aged 30-40, the pulse rate during the oculocardial test decreases from 70.0 2.4 to 60.0± 2.4 hr/min. In practically healthy people of this age, when compared with the background state, the same changes are observed as in 20-30-year-olds. Thus, the study of vegetative reactivity indicates a decrease or distortion of reactivity in the first group with neurotic disorders and indicates an increase in sympathetic influences on vegetative reactivity that occur in response to irritation of reflex zones. In participants with neurotic disorders, an increase in ergotropic shifts in the autonomic nervous system during mental and physical activity is observed, and, unlike healthy people, it is excessive. At the same time, more pronounced changes are observed in people with neurotic disorders aged 20-30. The transition of subjects to a horizontal position during the ortho-test was accompanied by a decrease in heart rate, close to the initial one. However, in contrast to healthy people, in persons with neurotic disorders in all age groups, the increase in heart rate exceeds this by 11-15 beats/min, which indicates the excess of ergotropic effects of vegetative support of physical activity.

Vegetative disorders rarely act as an independent disease, as a rule, they are secondary, developing against the background of various kinds of mental, somatic, neurological disorders. In some cases, they play a significant role in the pathogenesis of the disease, in others they occur secondarily, but affect its course (Polyakova et al., 2023; Solovieva et al., 2000; Tarabrina, 2012). The study of the vegetative sphere in middle-aged people with neurotic disorders, compared with healthy people, reveals an increase in vegetative tone, while the vegetative support of mental activity is excessive (Mogilev, 2003; Pogosov et al., 2017; Vein, 2000; Yumatov, 2001). According to studies O.V.Vorobyova et al. (2000), in young patients (up to 25 years) with anxiety-depressive emotional disorders, vegetative disorders of a permanent, paroxysmal nature, as well as cardialgic syndrome were identified.

It is known that in the non-specific systems of the brain, within the limbic-reticular complex, the central and suprasegmental apparatuses of the autonomic nervous system are localized, consisting of activating or ergotropic and inhibitory or trophotropic mechanisms. In this case, a balanced relationship is formed between these links, which, according to the definition of the authors (Vein, 200), is reflected in the concept of the vegetative tone of the body. The vegetative balance on the periphery is determined by the equilibrium of sympathetic and parasympathetic mechanisms. With changes in the FS, a tendency was observed to increase the heart rate,

respiration, decrease the amplitude of the plethysmogram and increase the GSR indicators. Similar dynamics of vegetative indicators, reflecting the level of activity of the central nervous system during the transition from a state of rest to vigorous activity, were noted by other researchers (Zazykin et al., 2015). In our studies, in patients with neuroses, in all age groups, there is an increase in ergotropic shifts in the autonomic nervous system during mental and physical activity, which, unlike healthy people, are excessive. The greater the tonic tension, the weaker the expression of phase shifts (Vein, 2000). This relationship was first described by Wilder J. (Wilder, 1957) and formulated as the "Law of the initial level". In this case, the lack of dynamics of vegetative indicators can be explained by the action of this law, which in turn confirms the correctness of its basic provisions.

**Table1.** Vegetative indices of war participants aged 20-40 years in a calm state and under various emotional influences

| **20-30 AGE 1 gr** | | **Calm** | **Tension** | **-E** | **+ E** | **30-40 AGE 2 gr** | | **Calm** | **Tension** | **- E** | **+ E** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **HR** | H | 72.1±2.1 | 84±2.7 | 78.0±3.4 | 82.1±4.5 | **HR** | H | 70.2±2.4 | 82.0±2.1 | 76.0±0.4 | 80.1±2.3 |
| | p | | | | | | p | | **<0.01** | **<0.05** | **<0.01** |
| | N | 92.0±4.4 | 98.0±3.2 | 84.0±2.8 | 97.6±2.4 | | N | 75.0±2.9 | 90.0±2.3 | 81.0±0.3 | 88.0±2.3 |
| | P1 | **<0.01** | **<0.01** | | **<0.05** | | P1 | | **<0.05** | **<0.001** | **<0.05** |
| **RR** | H | 16.0±2.1 | 21.0±4.0 | 18.7±2.1 | 20.0±0.5 | **RR** | H | 15.0±1.5 | 20.0±1.0 | 17.5±2.2 | 20.0±1.5 |
| | p | | | | | | p | | | | <0.05 |
| | N | 15.0±0.3 | 18.0±0.9 | 20.0±2.1 | 24.0±0.7 | | N | 17±1.4 | 22.0±1.0 | 18.0±0.4 | 20.4±0.3 |
| | P1 | | | | **<0.001** | | P1 | | | | |
| **APG** | H | 1.0±0.1 | 0.8±0.4 | 1.7±0.1 | 1.2±0.1 | **APG** | H | 1.1±0.4 | 0.7±0.1 | 1.0±1.0 | 1.2±0.1 |
| | p | | | **<0.001** | | | p | | | | |
| | N | 1.0±0.09 | 0.95±0.06 | 2.1±0.1 | 1.6±0.1 | | N | 1.0±0.4 | 0.5±0.3 | 1.3±0.1 | 1.6±0.15 |
| | P1 | | | **<0.01** | **<0.01** | | P1 | | | | **<0.05** |
| **GSR** | H | 1.2±0.2 | 1.4±0.2 | 1.3±0.1 | 1.2±0.2 | **GSR** | H | 1.0±0.2 | 1.7±0.2 | 1.4±0.2 | 1.1±0.1 |
| | p | | | | | | p | | **<0.05** | | |
| | N | 1.3±0.7 | 1.4±0.8 | 1.8±0.2 | 2.1±0.3 | | N | 1.4±0.1 | 1.2±0.13 | 1.1±0.3 | 1.8±0.3 |

***Notes:*** *H - Healthy, N - Neurotics, HR – Heart Rate, RR - Respiratory Rate , APG - Amplitude Plethysmogram, GSR - Galvanic-Skin Reaction, CS - Calm State, TS - Tension State , (-E)- negative emotional state, (+E)- positive emotional state statistically significant difference with the indicators -P - comparison by autonomic reactivity,P1- comparison with neurotics of the same age*

**Table 2.** Indicators of autonomic reactivity and ortho-clinostatic tests in war veterans aged 20-40 (healthy and neurotics)

| **Test** | **State** | **20-30 AGE 1 gr** | **30-40 AGE 2 gr** |
|---|---|---|---|
| **Fon** | H | 73.4±2.9 | 70.0±2.4 |
| | N | 70.0±2.2 | 68.0±1.5 |
| **Oculo-cardiac** | H | 62.3±3.1 | 60.0±2.4 |
| | P | **<0.05** | **<0.01** |
| | N | 64.0±2.1 | 56.0±2.7 |
| **Sinocarotid** | H | 68.3±3.2 | 70.0±2.4 |
| | N | 68.0±3.4 | 67.0±2.4 |
| **Solar** | H | 60.2±2.7 | 68.0±2.2 |
| | P | **<0.01** | |
| | H | 66.0±2.7 | 65.0±4.3 |
| **Ortho-test** | H | 78.7±2.1 | 76±1.4 |
| | P | | **<0.05** |
| | H | 78.7±4.0 | 77±3.0 |
| **Wedge test** | H | 77.2±2.5 | 73.1±1.3 |
| | N | 77.3±4.1 | 70.2±4.4 |

It was revealed that age characteristics and dynamics of the vegetative sphere in middle-aged individuals with neurotic disorders are objective indicators for HR, RR, PG and GSR and differ in different emotional states and with changes in emotional-vegetative reactivity. Under conditions of physiological rest, HR, RR and emotional-vegetative indicators in 20-40-year-old practically healthy men show high variability of absolute values. In neurotic disorders of middle age, disorders in the regulation of suprasegmental apparatuses of the autonomic nervous system were revealed.

## REFERENCES

**Bashkireva T.V., Severin A.E**. (2017) Extreme activity in research of physiology and psychology: monograph *Ryazan State University named after S.A.Yesenin. Ryazan: RSU*, 174 p. (in Russian).

**Bodrov V.A.** (2006) Psychological stress: development and overcoming. Moscow: PerSe, 523 p. (in Russian).

**Bundalo N.L**. Chronic post-traumatic stress disorder: monograph. *Krasnoyarsk State Medical University named after prof. V.F.Voyno-Yasenetsky*. Krasnoyarsk: KrasSMU, 349 p. (in Russian).

**Dyukova G.M.** (1977) Clinical and experimental study of the autonomic nervous system in neuroses: *Dis. ... cand. med. sciences*, M., 156 p. (in Russian).

**Evdokimov V.I., Marishchuk V.L., Gubin A.I.** (2008) Emotional states in extreme conditions of activity and their correction. *Bulletin of Psychotherapy*, **№26:** 56–66. (in Russian).

**Gefele O.F.** (2016) Psychology of extreme activity: a tutorial. *Tver State Technical University*, 79 p. (in Russian).

**Kadyrov R.V.** (2012) Post-traumatic stress disorder (PTSD): the state of the problem, psychodiagnostics and psychological assistance. SPb.: Rech, 447 p. (in Russian).

**Kekelidze Z.I., Portnova A.A.** (2009) Diagnostic criteria for post-traumatic stress disorder. *Journal of Neurology and Psychiatry named after S.S. Korsakov*, **109(12):** 4–7. (in Russian).

**Kolosova O.A**. (2000) The role of personality traits in the formation of psychovegetative disorders. *In: Vegetative disorders*, Moscow: Medinformagenstvo, p. 463-470. (in Russian).

**Korolyuk V.S., Portenko N.I., Skorokhod A.V., Turbin A.F.** (1985) Handbook of probability theory and mathematical statistics. Moscow: Nauka, 640 p. (in Russian).

**Mogilev V.A.** (2003) Pedagogical aspects of social rehabilitation of persons who have suffered psychotraumatic stress of a combat situation: a teaching aid. *Novgorod State University named after Yaroslav the Wise* [and others], 35 p. (in Russian).

**Pogosov A.V., Sochivko Yu.N., Sochivko N.S.** (2017) Remote consequences of post-traumatic stress disorders in combatants (clinical, psychopathological and rehabilitation aspects): [monograph]. Kursk: Kursk State Medical University (KSMU), 206 p. (in Russian).

**Polyakova O.B.** (2023) Psychology of post-traumatic stress: textbook [Electronic resource]. M.: State Budgetary Institution "Research Institute of Health Protection of the Moscow City Health Department", 292 p. URL: https://niioz.ru/moskovskaya-meditsina/izdaniya-nii/metodicheskie-posobiya/ (in Russian).

**Sartaev Zh.N.** (2010) Neurophysiological disorders in chronic stress in military personnel and their prevention [monograph]. Omsk: Poligr. Center KAN, 2010. 182 p. (in Russian).

**Shoifet. M.S.** (2008) Tarkhanov (1846–1908). 100 Great Doctors. M.: Veche, 528 p. (in Russian).

**Solovieva A.D., Filatova E.G., Averkina N.A.** (2000) Treatment of autonomic disorders with Xanax. *Journal. Neurol. and Psychiatrist*., **No. 1:** 28-32 (in Russian).

**Tarabrina N.V**. (2012) Psychological consequences of exposure to high-intensity stressors: post-traumatic stress. *Psychological Journal*, **33(6):** 20-33 (in Russian).

**Vein A.M**. (2000) Vegetative disorders: Clinic, diagnostics, treatment. M.: Medinformagenstvo, 752 p. (in Russian).

**Voloshin V.M.** (2005) Post-traumatic stress disorder: phenomenology, clinic, systematics, dynamics and modern approaches to psychopharmacotherapy. M.: Anaharsis, 199 p.

(in Russian).

**Vorobyova O.A., Mollazade A.N.** (2000) Cerebral homeostasis and vegetative regulation. *In: A.M.Vein (ed.). Vegetative disorders*. M.: Medinformagenstvo, p. 672-687 (in Russian).

**Vorobyova O.V., Khanaev B.A.** (2000) Daily outpatient monitoring of cardiovascular parameters in patients with panic disorders. *Zhurn. Neurol. i Psychiatrist.*, **No. 1:** 33-37 (in Russian).

**Wilder J.** (1957) The low of initial value in neurology and psychiatry. *J. Nerv. Ment. Dis.*, **125:** 73-86

**Yumatov E.A.** (2001) Objective monitoring of vital physiological functions of a person under emotional stress. *Proc. XVIII Congress of the Physiological Society named after I.P.Pavlov*, Kazan: p. 28 (in Russian).

**Zazykin V.G., Kandybovich S.L., Sekach M.F., Smulsky S.V.** (2015) Human mental stability in special and extreme conditions of activity: a monograph. Moscow: Academy of military sciences: Alteks, 727 p. (in Russian).

**Zuikova A.A.** (2013) Features of adaptation after exposure to combat stress and injuries: a monograph. N.Novgorod: Nizhny Novgorod State Medical Academy, 251 p. (in Russian).

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