Role of stress risk in development and course of cerebrovascular pathology

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The aim of research was to evaluate peculiarities of the influence of stress risk factors (behavioral and psychoemotional) in patients with cerebrovascular pathology (CVP) in the dynamics of its development as targets of psychological help.

Materials and methods. The study involved 122 patients with cardiovascular disease with high risk of development CVP – group 1 (G1), 134 patients with clinical manifestations of CVD in form of transient ischemic attacks (TIA) in history – group 2 (G2) and 127 patients who had an ischemic stroke (IS) – group 3 (G3). As a comparison group (CG) observed 47 conditionally healthy persons with no risk or signs of CVP, verified by clinical and laboratory studies. To study the potential stress factors, the Boston Stress Test used with a modification of scoring scales.

Results A high level of stress in the G1-3 was diagnosed, which prognostically indicated about a significant risk for the development of somatic and psychic changes in patients with CVD (34.9±11.7 points in G1, 37.1±11.9 points in G2 and 37.4±12.0 points in G3, p=0.201), whereas in the CG the stress potential was lower (27.7±12.8 points). The correlation between behavioral and psychoemotional stress components showed that in patients with CVP was a higher level of behavioral stress-potentiating factors (18.0±6.1 points versus 17.0±6.1 points, p<0.001), and in patients with IS – psycho-emotional (16.8±5.1 points versus 20.6±7.42 points, p<0.001). While in persons with TIA and CG – in the formation of stress disorders acts the both behavioral and psycho-emotional components (18.3±6.2 and 18.8±6.3 points, p=0.095 in G2, 13.8±6.5 and 13.9±6.8 points, p=0.81).

Conclusions. The higher level of stress, the influence of a wide range of stress-potentiating factors, especially psycho-emotional genesis, in patients with cardiovascular risk and CVD, suggest the need to developing, organizing and implementing psychological measures for this contingent of patients based on a health-centered approach.

Introduction

In terms of mortality, Ukraine is significantly ahead of the share of developed countries of the world, and its highest levels are observed among the able-bodied population: according to the data of still peacetime, in comparison with EU countries, Ukraine exceeded the mortality rate of men in the age groups 30-44 4.9 times, women - 3.2 times [1]. In general, the standardized rate of mortality of the population of working age is 2.4 times higher than in EU countries and 1.5 times - the average rate in Europe [2].

According to research by the Institute of Demography and Social Research of the National Academy of Sciences of Ukraine, an average of 72-73% of deaths under the age of 65 are observed in Ukraine due to chronic non-infectious diseases, most of which are related to lifestyle [3]. In the structure of premature mortality, the leading role is played by diseases of the circulatory system (35.6% of the total number of deaths under the age of 65), external causes (20.6%) and malignant...
tumors (16%). It should be noted that in the EU is dominated by the same cause of death, however, most cases of premature deaths in Western countries falls not on cardiovascular disease and on malignant tumors (34.5%). The mortality rates from diseases of the circulatory system in Ukraine over the past decades have increased 1.7 times, while in the EU, on the contrary, they have fallen [1].

So, among the causes of death, which determine a decrease in the life expectancy of the population, the first place is occupied by those caused by living conditions and behavioral risk factors, and mortality from them in 50-70% of cases could be prevented [4, 5].

It is generally recognized that the epidemic of chronic noncommunicable diseases, primarily diseases of the circulatory system and cerebrovascular pathology (CVP), is largely associated with lifestyle and the emergence of physiological risk factors as a result. Risk factors for CVP is directly related to social, economic and environmental health determinants [4, 5, 6, 7]. The list includes the presence of bad habits, the presence and accessibility of healthy food, health services and infrastructure that support a healthy lifestyle, physical activity, psychosocial stress [8, 9, 10].

Among the risk factors that can be modified by taking measures at both the population and individual levels, smoking, obesity, arterial hypertension, dyslipidemia, inadequate physical activity and psychosocial stress are considered priority [11, 12, 13, 14].

Despite the fact that the confirmation of the connection between the presence of psychosocial (psycho-emotional) stress and the development of CVP supported by foreign and local scientists, since the 60s of the last century, they do not cease to this day. For example, the work published of the British scientists in 2015, refers to the results of a meta-analysis and 14 studies, 10 prognostic cohorts and 4 schemes of random controls, indexed in MEDLINE, EMBASE, CINAHL, PsycInfo and the Cochrane database for the period from 1980 to 2014. It turned out that psychosocial stress (general emotional or job stress or stressful life events) is an independent stroke risk factor [15].

The results of another study that examined the impact of risk factors and modification potential in the development of myocardial infarction (INTERHEART - «standardized survey of case-control of acute myocardial infarction in 52 countries, 15152 cases and 14820 control group”), showed that the ratio of myocardial infarction chances in individuals who suffered from psychosocial stress is 2.67 times greater than in the comparison group [16].

However, modern researchers have noted that, on the one hand, the mechanisms of mutual influence and the causal connection between stress and CVP require further study, and with another - emotional stress and its consequences is still underestimated by clinicians and researchers, as a risk factor modification of which may significantly affect epidemiology and prognosis of CVP [17, 18, 19, 20, 21].

Meanwhile, the recognition of the need to develop measures to prevent the negative impact of stress factors as a predictors of the formation and progression of CVP, is reflected in the National Plan of actions for noncommunicable disease to achieve the global objectives of sustainable development, adopted by the Decree of Cabinet of Ministers of 26.07.2018 № 530- p, in which the behavioral factor (p 2.1) is defined as the main risk factor for noncommunicable diseases, and diseases of the circulatory system in particular, and the harmful effect to psychoemotional health is separately indicated (p. 2.11). The core idea of this Plan is to develop the preventive direction of medical care at all levels of its provision, primarily due to "... the formation of the basics and skills of a healthy lifestyle of the population and the identification and monitoring of the presence and dynamics of risk factors at all levels of medical care”(p. 12), as well as" ... the formation of the skills of control and psychological impact of medical workers on patients who have identified risk factors for noncommunicable diseases, taking into account principles of medical deontology”(p. 3.6) [22].
Given the above, the hypothesis of this study was to thought that particular stress intensity and spectrum of potentiating factors as components of lifestyle of patients at different stages of CVP development, have a significant influence on the formation of maladaptive conditions for flow, treatment and recovery from illness and should be treated as targets of a system of measures for medical and psychological correction and support in the context of a holistic health-centered approach.

**Aim**

The aim of the work is to assess the characteristics of the influence of stress risk factors (behavioral and psychoemotional) in patients with cerebrovascular pathology in the dynamics of its development, as a target of medical and psychological assistance to this contingent.

**Contingent and research methods**

During the period from 2016 to 2018, on the basis of the Kharkiv Regional Clinical Hospital, the center for emergency medical care and catastrophe medicine, 383 patients with various stages of CVP were examined with informed consent, with compliance of the principles of bioethics and deontology: from a high risk of developing the disease due to cardiovascular risk factors (CVR) (with its clinical and laboratory verification with lipid profile determination), prior to a vascular catastrophe in history. The study included 122 patients who had cardiovascular diseases with a high risk of developing CVP - group 1 (G1), 134 patients with a clinical manifestation of CVP in the form of transient ischemic attacks (TIA) - group 2 (G2), and 127 patients with ischemic cerebral stroke (CI) - group 3 (G3).

Inclusion criteria for the study participants were: high risk or a clinically detailed picture of CVP, which developed on the background of cardiovascular diseases in the form of hypertension and coronary heart disease, verified by a clinical laboratory method; the absence of a psychiatric and narcological history, impaired consciousness and psychotic conditions at the time of examination.

The exclusion criteria were the presence of a history of mental and behavioral disorders, severe concomitant somatic pathology (decompensation state), severe somatic diseases (except for cardiovascular and CVP), the course of which can affect the mental state of patients.

Separation of patients is the following groups, in our opinion, will allow to trace the influence of behavioral, personality and psychosocial factors in the development and course of CVP at different, in terms of medical practices and medical-psychological paradigm, stages of disease.

Among G1 patients, the duration of the course of CVP ranged from 1 to 3 years, patients with TIA in G2 - clinical symptoms were observed from 6 months up to 2 years, patients with CI were in the period after a vascular catastrophe in a period of 3 months up to 18 months. The age of the examined was from 37 to 68 years. Among the subjects, men predominated - 58.5%, women accounted for 41.5%. Patients with hypertension made up 59.8% and with coronary heart disease 40.2%.

As a comparison group (CG) were examined 47 apparently healthy individual with no risk or signs of CVP, verified clinical and laboratory studies.

To study the factors potential stress load, which prognostically indicate a high risk of symptoms of distress in somatic and mental health problems, used the Boston test stress resistance (test "Lifestyle analysis " by R. Kupriyanov, Y. Kuzmin, 2012) with the modification of rating scales [23]. Along with the traditional scale for assessing the level of stress-associated load, 2 subscales were added, in accordance with the psychogenesis of the risk of stress vulnerability, which described the behavioral and psychoemotional components. Statistical processing was carried out using MS Excel.
Research results

By distribution of the patients with respect to the presence of stress potentiating factors revealed that about half of the patients in each group, including those surveyed in the CG had a high stress risk (51.6% in G1, 57.5% in G2 and 52.0% in G3, as well as 48.9% in CG).

The number of respondents with a moderate frequency of stress risk factors among patients in G1 was relatively larger, slightly less in G2 and the smallest in G3 (27.9%, 18.7% and 12.6%, respectively). In the group of patients after CI, about 1/3 of the people had an extremely high level of manifestation of stress load, while among patients with TIA and without clinical symptoms of CVP amounted to 1/5 of the respondents (35.4%, 23.9% and 20.5%).

Revealed a significant difference in the distribution between treatment groups, there was significantly less patients in CG with very high (12.8%) and more with moderate levels of potentiating stress load (38.3%) in comparison with surveyed groups (SG). Defined features indicated high current stress potential and the greater vulnerability of patients in G1, 2 and 3 to the stress as compared to the physically healthy participants from CG.

In general, the patients from SG are diagnosed with a high level of stress load, which is prognostically indicates a significant risk of physical and mental changes in patients with CVR and CVP (34.9 ± 11.7 points in G1, 37.1 ± 11.9 points in T2 and 37.4 ± 12.0 points in G3, p = 0.201), whereas in the CG stress potential was lower (27.7 ± 12.8 points).

The correlation of the influence of the behavioral and psychoemotional stress components in each group showed that patients with CVR have a higher level of behavioral stress-potentiating factors (18.0 ± 6.1 points versus 17.0 ± 6.1 points, p < 0.001), patients after CI - psychoemotional (16.8 ± 5.1 points versus 20.6 ± 7.42 points, p < 0.001), while in individuals with TIA and CG - both behavioral and psychoemotional components (18.3 ± 6.2 and 18.8 ± 6.3 points, p = 0.095 in G2; 13.8 ± 6.5 and 13.9 ± 6.8 points, p = 0.81).

Saying about behavioral stress potentiating factors - sleep/wakefulness rhythm disorders, physical activity, overweight (except CG) was equivalent in each of the represented groups. Also, for all patients, stress was caused equally by interpersonal problems, restrictions in social communication, inability to assertively solve current problems, inefficient organization of time with a lack of time for purely personal needs, which was especially pronounced in individuals from SG.

With advent of the specific, measurably significant for patients in the SG, physical manifestations of the disease formed the awareness of ill-health as a powerful stress factor, which enhances with the growth of somatic distress. That specific factor significantly distinguishes G1-3 respondents from the CG.

The appearance of symptoms of the disease in most cases motivated patients to correct their way of life as indicated by the quitting smoking, drinking alcoholic and caffeine-containing beverages. However, it should be noted that a certain category of patients retained bad habits, despite the unfolding of clinical symptoms.

Most healthy eating habits were observed by patients after CI, while patients with TIA showed a higher level of influence of this factor. These results suggest that nutrition is one of the main components of a healthy lifestyle in the development / prevention of physical illness.

About the psycho-emotional stress-potentiating factors, along with high levels of inability to express negative feelings in each of the groups, the role of this component grew from subjects with CVR to
patients undergoing CI. Similarly, there was an increase of influence of components such as the ability to financially meet their own needs, involvement in social life, the feeling of support in the faith.

For patients after CI was significantly more urgent question of psycho-emotional support from the family and close friends, that is often expressed in a high level of expectations, combined with the reluctance of relatives to meet the current needs of patients (emotional and physical), and therefore dissatisfaction of real situation. The results according to described criteria indicate the growing role of assistance and the nature of relations in patients with enhanced clinical symptoms.

Among the respondents, there was a decrease in the ability to abstract from the situation, formality and specificity of thinking as the severity of the situation intensifies at the expense of the physical state.

The dominance of the influence of behavioral factors of stress risk in patients with high CVR over psycho-emotional ones indicated the important role of the physical basis of health and, accordingly, the need to introduce a healthy lifestyle as the basis for the prevention of diseases.

Action of stress components in patients with TIA was balanced, on the one hand, by strengthening the psychological and emotional component in the form of increased mental stress and the inclusion of non-adaptive ways of acting out in the clinical manifestations of the disease as a threat signals, and on the other hand - weakening the behavioral component - as a result of lifestyle modifications in response on the symptoms of the disease in order to prevent the negative consequences of CVP.

Expressive effect of psycho-emotional component in the subjects from G3 was, firstly, due to the influence of traumatic events such as CI both with menacing state with unfavorable to life prediction and disability and, consequently, the development of nosogenic responses; and secondly, a significant change (normalization) in behavioral habits as an integral part of the rehabilitation phase of treatment and medical rehabilitation measures (16.8 ± 5.1 and 20.6 ± 7.42 points in G3).

The discussion of the results

Disorders of physical and mental health that arise under the influence of stress factors in patients with CVP have a complex psychophysiological and psychological genesis, Fig. 1.
Fig. 1. The development of health disorders under the influence of stress

The high level of stress tension with reduced stress resistance, was found in the interviewed SG, indicated that this category of patients constitutes a risk group for the development of mental shifts and psychosomatic conditions. Behavioral and psycho-emotional factors that have had different psychological content on each of the stages of development of CVP, and, accordingly, demanded differentiated psychological interventions, affected the formation of psychological maladjustment (Fig. 2).
The behavioral and psycho-emotional components were dynamic interaction between different stress-potentiating factors in the context of the deployment of clinical symptoms of the disease, Fig. 3. The growth of physical malaise as an influence factor had the bi-directional effect, on the one hand, it caused mental tension growth, on the other - motivated to seek support and change maladaptive behavioral patterns.
A large representation of behavioral factors in the risk group indicated the leading role of a healthy lifestyle in the prevention of somatic pathology, while the growth of psychoemotional factors demonstrated increased mental distress and the inclusion of psychopathogenesis and maladjustment mechanisms at a deeper personal level.

**Conclusion**

1. CVP patients subjected to an ultrahigh (for them) the level of stress load, which, combined with a decrease in the stress-resistance, is a significant factor in the onset and progression of CVP.
2. High levels of stress load in patients with CVR and CVP determined by the high intensity of the psycho-emotional and behavioral risk stress factors. The behavioral component of the influence is determined by mutual influence of physical characteristics and lifestyle, psycho-emotional is determined by features of the response to stress in the sense of adaptation resource. Change of the ratio in favor of growing influence (spectrum expansion and enhancement of intensity) of psycho-emotional stress-potentiating factors with the progression of somatic pathology indicates an important role of mental patterns in CVP development.
3. Pathological effects of psychosocial stress are implemented by a variety of stress-potentiating factors, which depends on the stage of development of CVP. Spectrum of stress-potentiating factors is transforming with a progress of CVP: on early stages behavioral factors have the greatest negative influence, later on the progress of the disease they are giving way to psychoemotional factors that contribute to progression and aggravate the course of CVP.
4. The presence of physical illness acts as significant stress-potentiating factor that triggers a cascade of psychological and behavioral reactions on the part of person. Orientation of mental response depends on a number of personal, behavioral and psychosocial factors, which are focused on changing lifestyle to more health-centered in the case of favorable...
course of the adaptation process in patients with CVR and CVP, whereas unfavorable course deepens the existing distress and becomes a source of psychological maladjustment.

5. The higher level of stress risk and differences in the spectrum of stress-potentiating factors in patients with CVR and CVP compared with healthy respondents indicate importance of influence of stress and stress-response on the development and progress of the somatic pathology, which points the need to supplement standard medical care protocols with psychological interventions as pathogenetic in the prevention and treatment of patients with this (psycho-somatic) pathology.

6. Priority actions for medical and psychological assistance should be differentiated depending on the basic psychological problems and stress-potentiating factors that act in the current patients’ situation. Psychological interventions should focus on lifestyle modification, and generating healthy behavioral habits - for patients in the group of risk, for patients with TIA - the correction of maladaptive personality patterns, learning effective ways to cope with stress, for patients after CI - adapting to new physical and psychosocial status.

Prospects for Further Research

Available results give grounds to assert the need for organization and implementation of medical and psychological interventions for this group of patients based on the health-centered approach. The core area of medical and psychological work with patients with CVP is to increase their capacity for stress resistance and the transformation of the life style as pathogenetic defensive health preserving sources.

The study was carried out as part of the research topic of the Department of Sexology, Medical Psychology, Medical and Psychological Rehabilitation of the Kharkov Medical Academy of Postgraduate Education “Medical and psychological consequences of social stress and information and psychological warfare (macro-, microsocial maladjustment factors, formation mechanisms, psychodiagnostics, psychocorrection systems, preventive care)”, state registration number 0117U000371.

References


