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***THE RELATIONSHIP BETWEEN STRESS AND CARDIAC  
FUNCTION DISORDERS: A MODERN PERSPECTIVE***

***Rustamova F. B.***

***Rustamova Z. B.***

*Faculty of Pediatrics, Medical Biology and Fundamental Medicine II, TashSMU*

*Scientific supervisor: N.R. Hamzayeva. (TashSMU)*

***Abstract:*** *The issue of the psychosocial components of population health is considered one of the most complex and challenging problems. It is associated with key aspects of people's lives, their working conditions, and lifestyle. Psychosocial factors can be divided into two main categories: chronic stressors (socioeconomic status) and emotional factors (anxiety, depression, vital exhaustion, hostility), as well as their consequence—sleep disturbances. The outcomes of chronic stress are psychosomatic diseases, which include with full confidence arterial hypertension, myocardial infarction, and stroke. This review analyzes the relationship between psychosocial factors and the relative risk of cardiovascular diseases (CVD), which in individuals with affective disorders can be fully comparable to traditional risk factors.*

***Keywords:*** *arterial hypertension, myocardial infarction, stroke, psychosocial factors.*

***СВЯЗЬ МЕЖДУ СТРЕССОМ И НАРУШЕНИЯМИ СЕРДЕЧНОЙ  
ДЕЯТЕЛЬНОСТИ: СОВРЕМЕННЫЙ ВЗГЛЯД***

***Рустамова Ф.Б., Рустамова З.Б.***

*II факультет педиатрии, медицинской биологии и фундаментальной медицины*

*ТашГосМУ.*

***Научный руководитель: Хамзаева Н.Р.(ТашГосМУ)***

***Аннотация:*** *Вопрос психосоциальных компонентов здоровья населения считается одной из наиболее сложных и актуальных проблем. Он связан с*

ключевыми аспектами жизни людей, их условиями труда и образом жизни. Психосоциальные факторы можно разделить на две основные категории: хронические стрессоры (социально-экономический статус) и эмоциональные факторы (тревога, депрессия, жизненное истощение, враждебность), а также их последствие — нарушения сна. Результатом хронического стресса являются психосоматические заболевания, к которым с полной уверенностью относятся артериальная гипертензия, инфаркт миокарда и инсульт. В данном обзоре анализируется связь между психосоциальными факторами и относительным риском сердечно-сосудистых заболеваний (ССЗ), который у лиц с аффективными расстройствами может быть полностью сопоставим с традиционными факторами риска.

**Ключевые слова:** артериальная гипертензия, инфаркт миокарда, инсульт, психосоциальные факторы.

Psychosocial factors can be divided into two main categories: chronic stress factors (social factors) and emotional factors (psychological factors). Chronic stress factors include family status, stress at work and at home, low social support, and low socioeconomic status (education, occupation). Emotional factors include affective disorders such as depression, anxiety disorders, and antagonism, as well as fatigue and sleep disturbances, which are somatic manifestations associated with stress.

**1. Chronic stress factors.** Family status is an important component of the social support system, and marriage represents one of the strongest protective mechanisms within this system. In contrast, widowhood and divorce are considered acute life events. For example, mortality from cardiovascular diseases is significantly higher among divorced and widowed men, as well as among men who have never married, compared to married men. The impact of life events on an individual's emotional state depends on the age at which divorce or widowhood occurs, the presence of comorbid conditions,

and the influence of other risk factors [1].

At the same time, completely opposite findings have also been reported. For instance, the Whitehall Study found no increase in mortality among single men. In another prospective cohort study, after adjustment for social class and confounding factors, no increase in mortality from ischemic heart disease (IHD) was found among Finnish men. In Sweden, however, after standardization for other risk factors, mortality not related to cardiovascular diseases was higher among single men compared to married men [2].

Moreover, the highest incidence of new cases of ischemic heart disease (IHD) was observed among widowed men, while the highest mortality rates were found among divorced men. Accordingly, survival rates were lowest among single and divorced men [3].

*Family stress.* The concept that family stress or tension within the family may contribute to the development of ischemic heart disease (IHD) has long been recognized. In 1976, a study involving more than 10,000 men conducted by J. H. Medalie and U. Goldbourt demonstrated that spousal care and support played a significant role in reducing the risk of angina pectoris.

At the same time, another study showed that ischemic heart disease occurred 2.7 times more frequently in men whose wives were dissatisfied with their husbands' jobs [4].

*Education.* Education is an indicator of socioeconomic status (SES). A study conducted by G. D. Smith and colleagues (1986) found a similar relationship between socioeconomic status and arterial blood pressure (BP), regardless of whether education level or occupational class was considered. Belonging to the working class and not completing full education were associated with higher blood pressure.

In all mortality cases, men engaged in manual labor and those who did not complete their education died at a younger age [5].

*Occupation.* In many developed industrial countries, an inverse relationship between

occupational status and mortality has been established. Differences in mortality rates among working-age individuals were demonstrated in the well-known Whitehall Study conducted in the United Kingdom [6].

Additionally, the social gradient of ischemic heart disease identified in earlier Whitehall studies was further confirmed. This was observed alongside previously established associations between social status and factors such as obesity, smoking, high blood pressure, and unhealthy diet.

*Work-related stress.* In recent years, both international and local researchers have focused on the phenomenon known as “workplace hypertension” (a type of stress-induced arterial hypertension) [7]. Currently, the number of individuals whose blood pressure levels at work exceed those measured occasionally in clinical settings is increasing.

An excessive increase in blood pressure in response to stress has been observed in 25% of individuals. Another study found that 19% of patients with normal ambulatory blood pressure exhibited arterial hypertension during working hours. Among healthy individuals, men are more prone to such hyperreactivity than women. After cessation of stress, men show a slower return of blood pressure to baseline levels [8].

*Social support.* In the mid-1970s, epidemiologists “discovered” the concept of social support. Over the past 30 years, research on the relationship between stress, morbidity, and mortality has shown increasing interest in the role of social support in coping with occupational stress [9].

Social isolation has already been shown to be associated with increased morbidity and mortality from cardiovascular diseases. Social integration or disintegration may influence the development of arterial hypertension (AH), myocardial infarction, and stroke.

A study conducted in the United States evaluated the relationship between social

support and blood pressure levels among adult African American populations.

**2. Emotional factors. Anxiety.** Anxiety disorders are among the most common mental health conditions in the United States. According to annual statistics, 15–17% of the adult population (approximately 23 million people) suffer from one or more of the six types of anxiety disorders defined in the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)*.

Anxiety is highly prevalent across different populations and social groups worldwide. Over a lifetime, anxiety disorders develop in approximately 25% of the population, while pathological anxiety symptoms are detected in 30–40% of patients visiting general practitioners.

The prevalence of anxiety disorders in the population ranges from 0.6% to 2.7%, and in some cases up to 10.4%. The ratio of men to women suffering from anxiety disorders is approximately 1:4. Some authors consider this ratio to be underestimated, as men are less likely to seek medical help due to sociocultural factors [10].

High levels of anxiety and emotional instability, as well as excessive cardiovascular reactivity in response to mental stress, may play an important role in the development of arterial hypertension, and subsequently lead to myocardial infarction and stroke [11].

*Depression.* According to modern data, depression is diagnosed annually in 5–10% of the adult population in the United States, and approximately half of these individuals receive medical care. Additionally, 3–5% of adults suffer from mild mood disorders (dysthymia). In fact, up to 18% of the global adult population may experience depressive episodes at some point in their lives [3].

In Russia, approximately 9 million people are affected by depression. Since the beginning of the 20th century, the likelihood of developing depression has steadily increased, reaching the level of a true epidemic in the 21st century. According to projections from the Harvard School of Public Health, major unipolar depression was

expected to rank second in global disease burden after ischemic heart disease by 2020.

In the United States, the average age of first onset of depression is currently 27 years. This age continues to decrease with each successive generation, although severe unipolar depression can occur at any age.

Depressive episodes occur in approximately 12% of men over their lifetime. These indicators are similar across all socioeconomic groups. Today, depression is considered an independent risk factor in the pathogenesis of cardiovascular diseases, meaning it is not merely a secondary emotional response to illness but also a самостоятельный etiological factor. Depression may contribute to the development of somatic diseases (such as ischemic heart disease or arterial hypertension) and can worsen the prognosis of conditions such as stroke, myocardial infarction, and diabetes mellitus.

Patients with a history of depressive episodes were found to have a 2.6-fold higher incidence of stroke compared to those without depression. Treatment of depression did not significantly alter this association.

A history of mood disorders (dysthymia) also increased the risk of stroke, although this increase was not statistically significant [12]. Many researchers conclude that depression is more strongly associated with an increased risk of ischemic stroke rather than hemorrhagic stroke. *Vital exhaustion (depletion of life resources)*. The feeling of “extreme fatigue,” general weakness, and/or lack of жизненной энергии reflects a state of mental and physical exhaustion. Individuals in this condition often report decreased vitality, lethargy, fatigue, reduced activity, and increased irritability.

This state may also be described as mild depression or demoralization. These symptoms are frequently observed in patients with myocardial infarction and ischemic heart disease (IHD).

Based on this, a hypothesis has been proposed that prolonged psychological distress leading to exhaustion may precede the development of cardiovascular diseases (CVD).

One of the first completed studies investigating the relationship between vital exhaustion and subsequent stroke was conducted by G. E. Schuitemaker et al. (2004).

In individuals aged 41–66 with vital exhaustion, the risk of stroke increased by 13% with each additional point on the Maastricht Questionnaire (MQ) scale. This association remained statistically significant even after adjustment for other risk factors such as total cholesterol, systolic and diastolic blood pressure, diabetes mellitus, and smoking.

Thus, the authors concluded that vital exhaustion is a significant risk factor for the development of stroke [13].

*Hostility.* Hostility is defined as a negative, oppositional attitude toward the окружающий мир (primarily toward other people), mainly of a cognitive nature. It may manifest through negative emotions and behavioral patterns such as aggression, negativism, and social withdrawal [7].

J. S. Barefoot and colleagues demonstrated that hostility is a stable personality trait over time and can predict both cardiovascular and overall mortality, including mortality associated with elevated blood pressure.

Men in the highest quartile of hostility had more than twice the risk of all-cause mortality and nearly three times higher cardiovascular mortality compared to those in the lowest quartile. The risk of myocardial infarction was increased by 2.18 times.

The same study found that individuals at the extremes of anger expression (either excessive expression or suppression) had a significantly higher risk of developing arterial hypertension within 5 years. The authors concluded that both excessive expression and suppression of anger are associated with maladaptation, while balanced emotional regulation is associated with the lowest risk.

Men with high levels of anger expression had a twofold higher risk of stroke compared to those with low levels. Similar findings were observed in studies of healthy men aged 50–85, where anger expression increased the risk of stroke.

In multivariate models, the relative risk of stroke was 0.42 in men with high anger expression and 0.20 in those with low expression ( $p=0.04$ ). The authors concluded that low levels of anger expression in older men with high socioeconomic status may serve as a protective factor against cardiovascular diseases [14].

*Sleep disorders.* Sleep is one of the essential conditions for maintaining health and proper functioning of the body, and it is influenced by both physical and psychosocial factors. According to the World Health Organization, the minimum recommended duration of ночного сна is 6 hours, while the maximum is 10 hours.

Sleep disorders are among the most common conditions. For example, one-third of patients visiting general practitioners complain of dissatisfaction with sleep quality and its restorative function, while two-thirds of psychiatric patients report similar complaints. According to the U.S. National Commission on Sleep Disorders Research, 36% of adults experience sleep-related problems; approximately 40 million people suffer from chronic sleep disorders, and 20–30 million experience intermittent insomnia, which increases the risk of various diseases [15].

Sleep disturbances and daytime fatigue vary across occupational groups and represent a significant issue for both young and middle-aged individuals. People with sleep disorders tend to have reduced work productivity, a higher likelihood of traffic accidents, and increased incidence of psychosomatic diseases.

For example, workplace stress significantly contributes to the development of sleep disturbances, sleep deprivation, and daytime fatigue, regardless of working hours or lifestyle [16].

When sleep is disrupted, its primary function—restoration and adaptation of the organism to internal and external environmental changes—is impaired. This, in turn, may contribute to the development of cardiovascular diseases.

**Conclusion:** In conclusion, psychosocial stress (including depression, stress at home and at work, financial hardship, and adverse life events), alongside traditional risk factors of ischemic heart disease (IHD), has been identified as a significant predictor of acute myocardial infarction (AMI), regardless of ethnic or geographic context.

The reviewed literature highlights the importance of further in-depth study of psychosocial risk factors in cardiovascular diseases.

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