

**UDC 616.1; 616.8**

**RISK FACTORS OF ISCHEMIC STROKE AND THEIR  
INTERCONNECTION**

**Mishchenko Marina Mikhailovna**

MD, Graduate Student

Kharkiv National Medical University, Kharkiv, Ukraine

**Shevchenko Alexander Sergeevich**

MD, Master of Medicine, Economics and Pedagogy

**Mishchenko Alexander Nikolaevich**

MD, PhD, Assistant professor

Kharkiv Regional Institute of Public Health Services

Kharkiv, Ukraine

**Abstract.** Cardiovascular disease is the leading cause of premature death. In turn, among cardiovascular diseases, the leader is ischemic stroke. The main risk factors for ischemic strokes (behavioral, physiological, genetic, environmental) act synergistically and are pathogenetically interconnected.

**Keywords:** cardiovascular diseases, ischemic stroke, risk factors, age factor, hypodynamia, hypercholesterolemia, hyperglycemia, diabetes, obesity, overeating, salt, alcohol, tobacco smoking, arterial hypertension, atrial fibrillation, vascular atherosclerosis, environmental burden.

About 18 million people die prematurely every year from cardiovascular diseases in the world [1], the majority from coronary heart disease and stroke (15.2 million of all 56.9 million deaths from noncommunicable diseases in 2016) [2]. Cardiovascular diseases, as a rule, have a long course and are the result of exposure to a combination of genetic, physiological, environmental and behavioral factors. They are primarily associated with the older age group, but the number of young people in the age group of 30-60 years old among the dead is steadily growing. This trend is associated with

unhealthy diets, inadequate physical activity, exposure to tobacco smoke and alcohol abuse. The main risk factors associated with unhealthy diets are the abuse of fats, sugar and salt. The consequences of an unhealthy diet and inadequate physical activity can occur in individuals in the form of high blood pressure (arterial hypertension), high blood glucose and lipids (hyperglycemia and hypercholesterolemia), vascular atherosclerosis and obesity. Rapid and disorganized urbanization, the globalization of unhealthy lifestyles and an aging population also play a role in the development of cardiovascular diseases.

In 2016, the results of a large study of risk factors for noncommunicable diseases were published, which answered the question about the mortality associated with each risk factor. Thus, 7.2 million premature deaths per year are associated with tobacco use and second-hand smoke, 4.1 million deaths with excessive salt intake, 3.3 million with alcohol abuse, and 1.6 million with insufficient physical activity [3]. In addition to modifiable behavioral risk factors, metabolic: arterial hypertension, obesity, hyperglycemia and hyperlipidemia (hypercholesterolemia) are of great importance. High blood pressure is associated with 19 % of all deaths in the world. Low-income people die more often from heart disease because they use tobacco more often, have a tendency to unhealthy diets and limited access to health services.

Stroke – an acute disturbance of cerebral circulation with subsequent focal and cerebral symptoms lasting more than 24 hours – may be due to hemorrhage in the brain tissue and/or under the meninges, or insufficient blood supply to the brain parts with their subsequent softening (infarction). Ischemic stroke is pathogenetically caused by a critical decrease in cerebral blood flow as a result of vascular atherosclerosis, thrombosis, embolism [4].

The peak incidence of ischemic stroke occurs at the age of 60 years or more. But the age factor at a younger age plays an important role, as it is associated with the accumulation of a load of civilization diseases (vascular atherosclerosis, diabetes, obesity and hypertension) [5]. Patients with ischemic attacks, atherothrombosis, and rhythm and conduction disturbances in anamnesis are at greater risk. Hemorrhagic

stroke, or non-traumatic intracerebral hemorrhage, occurs 4-5 times less often than ischemic stroke [6].

The environmental burden of cardiovascular disease in 2009 for Ukraine was estimated by WHO at 13 with a maximum of 14 for the most disadvantaged countries [7]. However, a significantly greater impact the distress. This type of stress accompanied by hypertension, can provoked a significant spasm of the vessels, thrombosis and embolism.

**Table 1**

**Selected trends in risk factors for death from noncommunicable diseases for people aged 15+ according to WHO studies 2016-2018**

Risk factor	Year of study	Age, years	Frequency of occurrence, %
Hypodynamia (physical inactivity)	2016	18+	21
Tobacco use	2016	15+	27
Unregulated arterial hypertension	2015	18+	32
Hyperglycemia	2014	18+	9
Obesity	2016	18+	26
		10-19 (teenagers)	6
			Different units
Alcohol use (liters per year per capita)	2016	15+	9
Sodium chloride, kitchen salt (gram per day per capita)	2010	20+	11

In addition to the risk factors for death listed in Table 1, the risk of repeated acute cerebrovascular accidents, the frequency of which exceeds the frequency of primary strokes by about 15 times, should be noted [9]. Mortality in repeated strokes is also significantly higher. The risk of developing ischemic stroke is directly related to the degree of arterial hypertension. An increase in systolic blood pressure by 10 mmHg leads to an increase in the risk of stroke by about 2 times [10].

The risk of ischemic stroke increases with increasing body weight. Abdominal obesity increases the risk of stroke more than general obesity [11]. Obesity (to a

greater extent in women) is associated with such risk factors as arterial hypertension, diabetes mellitus, dyslipidemia. In particular, high cholesterol causes stenosis of large main and intracerebral arteries. Overweight is not only a risk factor for stroke, but also a factor that worsens the quality of life. Hyperglycemia is a significant risk factor for stenosing atherosclerotic lesions of the great arteries. The risk of developing ischemic stroke in the presence of type 2 diabetes mellitus increases by 1.5-2 times [12].

Atrial fibrillation is the most obvious risk factor for stroke and transient ischemic attacks: the immediate cause of 15-20% of ischemic strokes.

The interconnection of strokes with alcohol is dose-dependent [12]. When drinking large doses of alcohol, stroke is preceded by an increase in blood pressure, the occurrence of atrial fibrillation, thromboembolism. Long-term alcohol abuse slightly reduces the rate of development of atherosclerosis, but increases the permeability of blood vessels, and, as a result, the frequency of cerebral edema. Also, the risks of cardiomyopathy and the rate of its development increase.

The physical activity reduces the risk of stroke [12; 13]. If we compare low physical activity with medium and high, then the risk of repeated acute vascular disorders with moderate physical activity is lower by 20%, with high – by 27%.

Smoking is an independent risk factor for the development of ischemic stroke for both men and women: for heavy smokers (40 cigarettes per day), it is 2 times higher than for moderate smokers (10 cigarettes per day), in women this dependence is more revealed. The risk of stroke decreases after smoking cessation, and the increased risk is completely leveled after 5 years [11; 14; 15].

Understanding the interconnection of risk factors for ischemic stroke and other cardiovascular diseases allows you to more effectively provide assistance to victims of vascular accidents and plan comprehensive measures for the prevention and provision of medical care.

## REFERENCES

1. Noncommunicable diseases // World Health Organization (WHO), June 01, 2018. URL: <https://www.who.int/en/news-room/fact-sheets/detail/noncommunicable-diseases> (In Russian)
2. 10 leading causes of death in the world // WHO, May 24, 2018. URL: <https://www.who.int/en/news-room/fact-sheets/detail/the-top-10-causes-of-death> (In Russian)
3. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015 / GBD 2015 Risk Factors Collaborators // Lancet. – 2016. – Vol. 10053, No. 388. – P. 1659-1724. [https://doi.org/10.1016/S0140-6736\(16\)31679-8](https://doi.org/10.1016/S0140-6736(16)31679-8)
4. Kandyba D.V. Stroke : Lecture / D.V. Kandyba // Russian Family Doctor. – 2016. – Vol. 20, No. 3. – P. 5-15. DOI: 10.17816/RFD201635-15 (In Russian)
5. Chistik T. Rejuvenation of myocardial infarction and strokes: modern methods of prevention / T. Chistik // Arterial hypertension. – 2016. – Vol. 48, No. 4. – P. 57-69. DOI: 10.22141/2224-1485.4.48.2016.76997 (not av.). Ad. access: <https://cyberleninka.ru/article/n/omolozhenie-infarktov-miokarda-i-insultov-sovremennye-metody-profilaktiki> (In Russian)
6. Mishchenko T.S. Risk factors and clinical features in patients with various subtypes of ischemic stroke / T.S. Mishchenko, N.V. Ovsyannikova, V.V. Lebedinets // International Medical Journal. – 2011. – No. 3. – P. 27-32. URL: <http://dspace.nbuv.gov.ua/handle/123456789/30673> (In Russian)
7. Ukraine. Public Health and the Environment // WHO, Country profiles of Environmental Burden of Disease. – Geneva, 2009. URL: [https://www.who.int/quantifying\\_ehimpacts/national/countryprofile/ukraine.pdf](https://www.who.int/quantifying_ehimpacts/national/countryprofile/ukraine.pdf)
8. Ukraine. Selected adult risk factor trends // World Health Organization, Global Health Observatory data. Noncommunicable Diseases Country Profiles, 2018 URL: [https://www.who.int/nmh/countries/ukr\\_en.pdf](https://www.who.int/nmh/countries/ukr_en.pdf)

9. Turovinina E.F. Epidemiological aspects and technologies of secondary prevention in patients after ischemic stroke / E.F. Turovinina, D.I. Lebedeva, M.A. Agafonova, [et al.] // Medical almanac. – 2018, September. – Vol. 55, No. 4. – P. 119-122. (In Russian)
10. Gusev E.I. Epidemiology of stroke in Russia / E.I. Gusev, L.V. Skvortsova, L.V. Stakhovskaya // Journal of Neurology and Psychiatry. – 2003. – No. 9. – P. 114-118. (In Russian)
11. Kadykov A.S. Rehabilitation after a stroke / A.S. Kadykov. – M.: Miklosh, 2003. – 176 p. – ISBN 5-900518-05-1. URL: <https://www.mmbook.ru/catalog/newrologija/neurologyo/100330-detail> (In Russian)
12. Neurology: national handbook / ed. E.I. Gusev, A.N. Konovalova, V.I. Skvortsova. – 2nd ed., rev. and suppl. – M.: GEOTAR-Media, 2018. – In 2 vol., vol. 1. – 880 p. – ISBN 978-5-9704-4143-5. URL: <http://www.geotar.ru/lots/NF0004381.html> (In Russian)
13. Damulin I.V. Atrial fibrillation and stroke / I.V. Damulin, D.A. Andreev // Russian Medical Journal. – 2015. – Vol. 21, No. 6. – P. 41-45. URL: <http://www.medlit.ru/journalsview/medicaljournal/view/journal/2015/issue-6/213-fibrillyaciya-predserdiy-i-insul-t> (In Russian)
14. Shah R.S. Smoking and stroke: the more you smoke the more youstroke / R.S. Shah, J.W. Cole // Expert Review of Cardiovascular Therapy Journal. – 2010, July. – Vol. 8, No. 7. – P. 917-932. DOI:10.1586/erc.10.56
15. Neverovsky D.V. Smoking and ischemic stroke / D.V. Neverovsky // Neurology, neuropsychiatry, psychosomatics. – 2010. – No. 4. – P. 42-47. URL: <https://www.elibrary.ru/item.asp?id=16272114> (In Russian)