THE ROLE AND FUNCTIONS OF MODERN COMPUTER TECHNOLOGIES IN THE DIAGNOSIS OF ARTERIAL HYPERTENSION DISEASES

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Abstract. *Arterial hypertension is a chronic disease characterized by a blood pressure of 140/90 mmHg or higher in the arteries. This pathology is widespread worldwide and negatively impacts the functioning of vital organs such as the heart, blood vessels, and kidneys. The causes of hypertension are divided into two main types: primary (essential) and secondary. Among the primary risk factors, poor nutrition, sedentary lifestyle, genetics, and stress play a significant role. In the early stages of the disease, noticeable symptoms may not be observed, but symptoms such as headaches, dizziness, and palpitations can develop. Timely diagnosis and treatment, including adopting a healthy lifestyle, are crucial in preventing severe complications of hypertension. Modern computer technologies play an important role in diagnosing and managing hypertension. They ensure early detection of the disease, improve treatment quality, and enhance the quality of life for patients. Expanding the use of these technologies in medicine could significantly reduce hypertension-related complications in the future.*

Keywords: *Arterial hypertension, blood pressure, essential hypertension, secondary hypertension, stress.*

РОЛЬ И ФУНКЦИИ СОВРЕМЕННЫХ КОМПЬЮТЕРНЫХ ТЕХНОЛОГИЙ В ДИАГНОСТИКЕ АРТЕРИАЛЬНОЙ ГИПЕРТОНИЧЕСКОЙ БОЛЕЗНИ

Аннотация. *Артериальная гипертония – хроническое заболевание, характеризующееся артериальным давлением в артериях 140/90 мм рт.ст. и выше. Эта патология широко распространена во всем мире и негативно влияет на работу жизненно важных органов, таких как сердце, сосуды и почки. Причины гипертонической болезни делятся на два основных типа: первичные (эссенциальные) и вторичные. Среди первичных факторов риска значительную роль играют неправильное питание, малоподвижный образ жизни, генетика и стресс. На ранних стадиях заболевания заметных симптомов может не наблюдаться, но могут развиваться такие симптомы, как головные боли,*

головокружение, сердцебиение. Своевременная диагностика и лечение, включая здоровый образ жизни, имеют решающее значение для предотвращения тяжелых осложнений гипертонии.

Современные компьютерные технологии играют важную роль в диагностике и лечении гипертонии. Они обеспечивают раннее выявление заболевания, улучшают качество лечения и повышают качество жизни пациентов. Расширение использования этих технологий в медицине может значительно снизить осложнения, связанные с гипертонией, в будущем.

Ключевые слова: Артериальная гипертензия, артериальное давление, эссенциальная гипертензия, вторичная гипертензия, стресс.

Introduction

Arterial hypertension (AH) is one of the most common chronic diseases related to the cardiovascular system, affecting a large portion of the global population. This pathology is primarily characterized by consistently high blood pressure in the arteries. Normal blood pressure should be around 120/80 mmHg. However, when it consistently exceeds 140/90 mmHg, the diagnosis of hypertension is made. This condition damages the cardiovascular system, kidneys, brain, and other vital organs. Arterial hypertension has become one of the global health problems today. According to the World Health Organization (WHO), more than 1 million people worldwide suffer from hypertension. Over 9.4 million deaths annually are attributed to hypertension-related diseases. Although this disease is widespread in developed countries, statistics are also increasing in developing regions. Arterial hypertension not only affects individual health but also has negative economic and social impacts. It leads to a decrease in work capacity, an increase in medical expenses, and a decline in the quality of life. Hypertension complications, such as stroke, heart attack, kidney failure, and vision impairment, are among the leading causes of death and disability globally.

The Essence of Arterial Hypertension

Arterial hypertension is characterized by sustained high pressure inside the blood vessels. Blood pressure is measured by two main indicators:

Systolic pressure - the pressure when the heart contracts and pumps blood into the arteries.

Diastolic pressure - the pressure when the heart is at rest.

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Normally, these indicators should be around 120/80 mmHg. When blood pressure is high, it increases the load on the heart and blood vessels, leading to the thickening of blood vessel walls and the loss of their elasticity over time.

Arterial hypertension is classified into two main types:

Primary (essential) hypertension: The exact cause is unknown. This type accounts for 90-95% of cases. Genetic predisposition, unhealthy lifestyle, and environmental factors can contribute to primary hypertension.

Secondary hypertension: Associated with a specific cause, such as kidney diseases, endocrine disorders, hormonal imbalance, or side effects of certain medications.

Causes of Arterial Hypertension

Various factors can contribute to the development of arterial hypertension. These factors can be categorized into two groups:

Controllable factors: Poor nutrition, harmful habits, sedentary lifestyle.

Uncontrollable factors: Genetic predisposition, aging, gender differences.

Other major risk factors include:

 Poor nutrition: Consuming foods high in salt and fat increases blood pressure.

Lack of physical activity: A sedentary lifestyle leads to metabolic disorders.

 Harmful habits: Smoking and alcohol consumption constrict blood vessels and reduce their elasticity.

Stress: Chronic psychological stress increases the levels of stress hormones (adrenaline and cortisol), leading to higher blood pressure.

Age: As people age, blood vessels lose their elasticity.

Arterial hypertension (AH) is one of the most common cardiovascular diseases, and if not diagnosed or managed in time, it can lead to serious complications, such as stroke, infarction, and kidney failure. Modern computer technologies are crucial in the diagnosis, treatment, and monitoring of AH. Below are their main roles and functions:

Artificial Intelligence (AI) algorithms: These improve the speed and accuracy of AH detection. For example, AI analyzes heart rhythm, blood pressure dynamics, and other physiological data to predict the risk of hypertension.

Telemedicine platforms: These enable remote collection of blood pressure and other biometric indicators from patients, which is especially convenient for patients in remote areas.

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Blood pressure monitoring devices: Modern "smart" tonometers store blood pressure readings and transmit them to cloud servers. These data can be monitored remotely by doctors.

Mobile applications: These encourage patients to track their health and regularly monitor their blood pressure. For example, through reminders for medication intake.

Big Data technologies: These analyze large volumes of epidemiological and genetic data to detect the likelihood of developing hypertension.

Algorithmic models: These are used to predict the development dynamics of the disease.

For example, an individual treatment plan can be created based on a patient's lifestyle, genetic data, and medical history.

Biomarker analysis: AI systems help identify and research biomarkers for hypertension.

Virtual clinical trials: Computer models assess the effectiveness of new drugs.

Virtual reality (VR) and simulation technologies: These are used for training doctors in diagnosing and treating AH.

Interactive platforms: These provide the public with information about the disease and offer advice on reducing risk factors.

Relevance of the Problem Arterial hypertension is not only a threat to human health but also a significant burden on the global economy. This disease reduces production capacity, increases medical costs, and lowers the overall quality of life. Particularly in developing countries, hypertension is poorly controlled, leading to increased mortality and the spread of the disease. Due to the severe complications of the disease, timely diagnosis and treatment of hypertension are of crucial importance. Regular blood pressure measurements and the assessment of risk factors are necessary for diagnosis. This article discusses in detail the causes, clinical manifestations, diagnostic methods, and treatment approaches for arterial hypertension. Interactive platforms provide information about the disease to the public and offer advice on how to reduce risk factors. Relevance of the Issue Arterial hypertension is not only dangerous for human health but also continues to be a heavy burden on the global economy. The disease leads to reduced productivity, higher medical costs, and lower overall quality of life. Particularly in developing countries, hypertension is poorly controlled, leading to an increase in deaths and diseases.

Timely diagnosis and treatment of hypertension are crucial due to its severe complications.

Regular blood pressure measurements and risk factor assessment are necessary for diagnosis. This article elaborates on the causes, clinical manifestations, diagnostic methods, and treatment options for arterial hypertension.

This introductory section constitutes a large portion of the article. Please let me know if you would like to expand on any particular areas or emphasize specific aspects.

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