THE ROLE OF ARTIFICIAL INTELLIGENCE AND INFORMATION TECHNOLOGIES IN THE DIAGNOSIS AND TREATMENT OF NEUROLOGICAL DISEASES IN CHILDREN

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INTRODUCTION

Neurological diseases in children are considered one of the most urgent issues of modern medicine, as they directly affect the physical, psychological, and social development of the child. In recent years, the increasing number of neurological disorders has intensified the need for early diagnosis and effective treatment. Traditional diagnostic methods often require significant time and depend on human factors; therefore, the use of modern information technologies and artificial intelligence in medicine is gaining great importance.

Early detection of disorders in pediatric neurology is crucial, as timely diagnosis helps prevent severe complications in the future. Artificial intelligence technologies are widely applied for analyzing medical images, predicting disease progression, selecting individualized treatment strategies, and monitoring rehabilitation processes. Telemedicine, electronic medical databases, and mobile health applications contribute to improving the accessibility and efficiency of medical services.

The development of digital healthcare systems is also recognized as a priority at the international level. The World Health Organization emphasizes the necessity of implementing innovative technologies into medical practice. Therefore, studying the role of artificial intelligence and information technologies in diagnosing and treating neurological diseases in children holds both scientific and practical significance.

In recent years, the integration of digital technologies into the healthcare system has led to substantial advancements across all medical fields, including pediatric neurology and psychoneurology. Neurological diseases in children often develop at an early age and directly affect physical, intellectual, and psychological development. During growth, the nervous system of a child is highly sensitive, and various prenatal pathologies, birth trauma, infections, genetic factors, and environmental influences can lead to neurological disorders.

Thus, early diagnosis, correct clinical assessment, and effective treatment strategies are among the primary tasks of modern pediatrics and neurology. Information technologies and artificial intelligence systems enhance diagnostic accuracy and enable early-stage detection of diseases. In addition, digital monitoring systems, telemedicine platforms, and mobile health apps allow remote observation of a child's condition, control over rehabilitation processes, and improvement of treatment effectiveness.

CAUSES OF NEUROLOGICAL DISEASES IN CHILDREN

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Neurological diseases in children have a multifactorial nature. The nervous system begins forming during the fetal period and continues to develop after birth. Any unfavorable influence can lead to damage to the central or peripheral nervous system.

Genetic factors play a crucial role. Hereditary diseases, chromosomal abnormalities, and genetic mutations may lead to epilepsy, myopathies, neurodegenerative disorders, and autism spectrum disorders. If hereditary conditions are present in the family, the risk increases.

Factors affecting the mother during pregnancy are also significant: infectious diseases (rubella, toxoplasmosis, cytomegalovirus, influenza), toxic exposures, uncontrolled use of medications, alcohol and tobacco consumption, improper nutrition, vitamin and mineral deficiencies, fetal hypoxia, placental insufficiency, and severe toxicosis.

Delivery-related complications also play an important role. Birth trauma, asphyxia, prolonged or complicated labor, umbilical cord entanglement, prematurity, and low birth weight may later lead to cerebral palsy, motor impairments, and developmental delays.

Postnatal risk factors include traumatic brain injuries, meningitis, encephalitis, poisoning, metabolic disorders, severe somatic illnesses, high fever illnesses, and vitamin B deficiency.

Social and psychological factors can also contribute to the development of neurological issues, such as neuroses, tics, speech impairments, and sleep disorders. Excessive use of digital devices, low physical activity, and poor daily routine negatively affect the nervous system. Environmental factors such as pollution, radiation, heavy metals, and pesticides additionally increase the risk.

MEDICAL AND SOCIAL SIGNIFICANCE

Neurological diseases in children have substantial medical and social significance. They affect not only the health of the child but also social adaptation and quality of life. Many neurological disorders become chronic and require long-term treatment and rehabilitation.

These diseases include cerebral palsy, epilepsy, neuromuscular disorders, autism spectrum disorders, neuroses, consequences of traumatic brain injuries, and psychomotor developmental delays. They cause motor, speech, intellectual, and behavioral impairments and often result in disability.

The social impact includes the need for special education, restricted future employment opportunities, and financial and emotional burdens on families and the state.

THE ROLE OF INFORMATION TECHNOLOGIES IN DIAGNOSTICS

Information technologies significantly improve the accuracy and speed of diagnostics. Artificial intelligence analyzes electroencephalography (EEG), magnetic resonance imaging (MRI), and computed tomography (CT) data, detecting pathologies at early stages.

Electronic medical records allow storing patient history, comparing test results, and monitoring condition changes over time. Telemedicine enables remote consultations with specialists, which is especially beneficial for children living in remote regions.

TREATMENT AND REHABILITATION

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Treating neurological diseases in children requires a comprehensive approach, considering the age, severity, and individual characteristics of the child.

Medication therapy includes anticonvulsants, nootropic drugs, sedatives, vitamin B complexes, and medications that improve cerebral blood circulation — all strictly under medical supervision.

Rehabilitation includes physiotherapy, therapeutic physical training (PT), massage, electrophoresis, magnetotherapy, reflexology, hydrotherapy, speech therapy, and defectology sessions. Psychological and pedagogical support is equally important.

In certain cases, surgical intervention is necessary, such as for brain tumors, severe forms of epilepsy, and congenital abnormalities.

Artificial intelligence assists in creating personalized treatment plans, monitoring the effectiveness of therapy, and optimizing rehabilitation processes.

RELEVANCE OF THE ISSUE

Neurological disorders in children are one of the most pressing issues in modern pediatrics. They affect physical, mental, and intellectual development. Without timely intervention, severe complications may arise.

The increasing prevalence of neurological diseases, the influence of environmental and social factors, and perinatal central nervous system damage further heighten the relevance of this issue.

CONCLUSION

Neurological diseases in children represent a serious medical and social problem. Their development is influenced by genetic, perinatal, infectious, metabolic, and socio-psychological factors.

Modern information technologies and artificial intelligence systems significantly enhance diagnostic and treatment effectiveness. A comprehensive approach—medical treatment, rehabilitation, psychological support, social adaptation, and digital solutions—helps improve children's quality of life and reduce disability in society.

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