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THE ROLE AND IMPORTANCE OF MODERN COMPUTER TECHNOLOGIES IN THE DIAGNOSIS AND TREATMENT OF AUTISM IN YOUNG CHILDREN

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Abstract. *This article is aimed at diagnosing autism spectrum disorders among adolescents using computer technologies, improving modern medicine, increasing the significance of computer technologies in our daily lives, and enhancing the efficiency of future medical professionals in working with computer technologies.*

Keywords: *Autism Spectrum Disorder (ASD), sensory integration, speech therapy, ABA therapy (Applied Behavior Analysis), Asperger's syndrome, autistic behaviors, EEG and neurofeedback technologies, wearable technologies.*

РОЛЬ И ЗНАЧЕНИЕ СОВРЕМЕННЫХ КОМПЬЮТЕРНЫХ ТЕХНОЛОГИЙ В ДИАГНОСТИКЕ И ЛЕЧЕНИИ АУТИЗМА У ДЕТЕЙ РАННЕГО ВОЗРАСТА

Аннотация. *Целью данной статьи является диагностика расстройств аутистического спектра у подростков с помощью компьютерных технологий, совершенствование современной медицины, повышение значимости компьютерных технологий в нашей повседневной жизни, повышение эффективности работы будущих медицинских работников с компьютерными технологиями.*

Ключевые слова: *Расстройство аутистического спектра (РАС), сенсорная интеграция, логопедия, АВА-терапия (прикладной анализ поведения), синдром Аспергера, аутистическое поведение, технологии ЭЭГ и нейробиоуправления, носимые технологии.*

INTRODUCTION

Modern technologies are opening new doors in the fields of medicine and psychology, presenting revolutionary approaches to treating various diseases. The role of technological advancements is especially crucial in diagnosing and treating autism spectrum disorder (ASD) in children. Innovative solutions such as artificial intelligence, virtual reality (VR), robot-assisted therapy, and smart devices offer individualized therapy methods for children with autism.

These technologies not only help develop social and communication skills but also prepare children for independent living. In this regard, modern technologies have introduced a new era in autism treatment.

MAIN PART

Autism (also called childhood autism, infantile autism, or early childhood autism) is a disorder characterized by significant and pervasive impairments in social interaction and communication, along with restricted interests and repetitive behaviors. These symptoms typically appear before the age of three. Milder signs and symptoms are referred to as autism spectrum disorder (ASD). The causes of autism are closely linked to genes that affect synaptic connections in the brain, but the genetics of the disorder are complex, and it is unclear what exactly contributes most to the development of ASD. In rare cases, it has been associated with exposure to substances that cause congenital defects. Some other proposed causes remain controversial, such as the hypothesis linking autism to childhood vaccinations, which lacks scientific evidence. According to data from the United States, in 2011–2012, 2% of schoolchildren were officially diagnosed with autism or ASD, which was significantly higher than the 1.2% recorded in 2007. Since the 1980s, the number of autism diagnoses has increased dramatically.

Many areas of the brain are affected by autism, but how these changes develop remains unclear. Parents usually notice signs of autism within the first two years of a child's life. Early behavioral and cognitive interventions can help children develop self-help skills, social interaction, and communication abilities, but no treatment is currently available to completely cure autism.

Few children manage to transition to independent living as adults, though some achieve success. Additionally, while some individuals seek a cure, others view autism not as a disease but as a special, alternative state of being. Autism spectrum disorder (ASD) manifests as various anomalies in brain structure and function. The primary symptoms include communication difficulties, repetitive behaviors, limited interests, and unusual responses to sensory stimuli. The disorder typically emerges in infancy, with signs appearing as early as six months of age. While the causes of autism are attributed to multiple, uncertain factors, a small percentage of affected individuals display exceptional talents in music, mathematics, or artistic reproduction. Common behaviors in autism include repetitive movements such as rocking, hand-flapping, and finger-flicking, as well as intense focus on specific topics, such as memorizing all information about a certain subject (e.g., sports) and frequently discussing it.

Diagnosis and Modern Technologies

Technologies such as magnetic resonance imaging (MRI), electroencephalography (EEG), artificial intelligence (AI), and virtual reality (VR) are used to diagnose autism. MRI helps detect brain function abnormalities and disrupted neural connections, EEG measures brain electrical activity, and VR analyzes brain activity and observes children's behaviors. AI processes data from MRI and EEG to assist in diagnosis.

Speech Therapy

Speech therapy is a specialized approach aimed at treating and improving speech, pronunciation, voice, swallowing, and language-related issues. It is suitable for both children and adults and is typically conducted by speech therapists.

Goals of Speech Therapy:

- Teaching correct pronunciation of speech sounds
- Expanding vocabulary and developing language skills
- Correcting swallowing disorders
- Improving social communication skills
- Managing voice and speech disorders

Sensory Integration Therapy

Sensory integration is the ability to process and appropriately respond to stimuli received through various sensory organs. This process plays a crucial role in coordinated movement, social adaptation, and cognitive activity. Sensory integration disorders are often associated with autism, developmental delays, or neurological conditions.

Therapy Methods:

- Balance exercises on teeter boards
- Sensory material interaction (sand, clay, textured surfaces)
- Movement exercises using inflatable play structures
- Specialized sensory rooms with controlled light, sound, and tactile stimuli

ABA Therapy (Applied Behavior Analysis)

ABA therapy is an evidence-based behavioral analysis approach that helps children with autism and developmental disorders develop social, communicative, and learning skills. This therapy strengthens positive behaviors and reduces undesirable ones.

Goals of ABA Therapy:

- Enhancing independence in daily life
- Developing social skills

- Improving speech and communication
- Reducing problematic behaviors
- Facilitating academic learning

Therapy Stages:

- Initial assessment: Evaluating the child's current skills and behaviors
- Developing an individualized treatment plan
- Conducting therapy sessions
- Continuous monitoring and evaluation

Wearable Technologies

Wearable technology refers to devices that can be worn on the body to collect and process data in real time. These devices are used in healthcare, fitness, social interaction monitoring, and therapy optimization.

Types of Wearable Technologies:

- Smartwatches: Monitor heart rate, sleep quality, and movement
- Fitness trackers: Track steps, calories, and physical activity
- Smart glasses: Equipped with augmented reality (AR) features
- Medical devices: Measure blood pressure and glucose levels
- ECG monitors: Track heart function
- Smart clothing: Monitors body temperature and muscle activity

Asperger's Syndrome

Asperger's syndrome is a developmental disorder characterized by significant difficulties in social interaction, along with restricted, repetitive patterns of behavior and interests. Unlike classic autism (Kanner's syndrome), individuals with Asperger's syndrome typically retain language and cognitive abilities

Diagnosing Asperger's syndrome is complex and requires various screening tools, including:

- Asperger Syndrome Diagnostic Scale (ASDS)
- Gilliam Asperger's Disorder Scale (GADS)
- Childhood Asperger Syndrome Test (CAST)
- Autism Spectrum Screening Questionnaire (ASSQ)
- Krug Asperger's Disorder Index (KADI)

CONCLUSION

Modern technologies play a crucial role in diagnosing and treating autism spectrum disorder in children. Artificial intelligence enhances diagnostic accuracy and speed, while virtual reality and robot-assisted therapy offer innovative approaches to developing social and communication skills. Wearable technologies continuously monitor behavioral and sensory responses, optimizing therapy processes.

By personalizing autism treatment, these technologies enable tailored therapeutic solutions for each child. Their proper and intelligent application helps children prepare for independent living. Therefore, the widespread integration of innovative technologies in autism diagnosis and treatment is of great importance.

REFERENCES

1. Modern Information Technologies in Uzbek Language and Literature Education - Textbook
2. Autism in Children: Causes, Early Signs, and Treatment Methods - Research Article
3. The Problem of Childhood Autism in the Modern World - 2012
4. Autism: A Disease or a Psychological Condition? - Journal, 2018
5. Neurological Disorders - Author: Zarifboy Ibodullayev
6. Mental Disorders